



MODEL



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January 1987

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AIRPLANE

T

R/C MODELING MAGAZINE

Canada \$3.25

NEWS

■ Basics of
TAIL WHEELS

■ Robbe
ROBIN

Oshkosh '86 -
Let It Fly!

■ Basics
of R/C

■ The Great R/C Race



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MODEL AIRPLANE NEWS

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ABOVE AND ON THE COVER: Oshkosh is the place to see rare aircraft, and the pristine P-40K on the cover is no exception. Owned by Bob Byrne of Bloomfield Hills, Michigan, and flown by Bill Dodd, it took top honors in its category at the 1986 fly-in. Cover photo by Budd Davisson. Rich Uravitch caught the smoking WACO above in his lens. See Rich's detailed coverage of Oshkosh on page 23.

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Editorial

by DAN SANTICH

Product Safety

HERE HAVE RECENTLY been a number of reports and correspondence regarding the failure of propellers as a result of slippage pins and peripheral locking screws that are currently being manufactured as part of some four-cycle engines.

A recent injury reported to the AMA described an incident in which the backfire of a "large four-cycle" caused the prop to shatter and consequently strike a hapless person at the scene.

A recent letter from John Preston of the AMA Safety Council proposes the outlawing of drive pins and peripheral retaining screws. Since that letter, a number of manufacturers have voiced their opinion on the issue. O.S. engines has also changed the prop mounting system on their large four-cycle engine (240) to now incorporate a double prop nut with the peripheral retaining screws.

The safety of modeling, in any endeavor, should be our first consideration. Propellers offer the greatest hazard to life and limb, and I'd appreciate any information on the subject. If anyone has similar experiences to the ones cited above, or a possible solution to any of these problems—let's hear from you.

The only way to resolve such a matter is to gather the facts, sort them out, and then try to achieve a workable solution. The simple notion to outlaw a technique or a method, which may not indeed be the culprit, is premature. Engine manufacturers have invested many thousands of dollars to assure safe reliable products for the modeler, and to force a change on their manufacture of a product, perhaps even unnecessarily, ultimately will reflect in the selling

price of that product. It seems, then, that a testing program ought to be initiated to have these matters laid out, tested, destroyed, or whatever, in order to put them to rest—or at least to establish the facts. As it stands, there is only speculation, suspicion and conjecture.

On a happier note, Air Age Incorporated continues to expand its base of modeling magazines.

Model Airplane News was our first, established 1929, *Radio Control Car Action* arrived in

December 1985—and exceeded everyone's expectations—and now, we have a third, *American Boat Modeler*, which is surely emerging as the source for the aquatic-minded. Because of the specialized publications we've added, we're now able to devote more attention to airplanes in *Model Airplane News* than ever before!

Because of you, the modeler, we've been able to make these changes, while our primary goal of keeping you happy remains intact.

THIS MONTH. "Oshkosh '86": what else can you say about the most outstanding extravaganza in aviation?

This year was a mind-blowing experience for our reporter Rich Uravitch, yet his words can only tell the story, but can't quite convey all the emotions. You just have to be there yourself in '87! Jack Aycock does a kit review on an unusual airplane, the Robbe Robin; the Balsa USA North

Star is an amphibian you'll surely enjoy; Art Schroeder goes for broke with the RPM Trystar; and Randy

Randolph gets down to basics for those who are just starting out in the hobby.

This issue has a lot for everyone, and we hope you'll enjoy it. ■





Airwaves

Keep it Simple

The letter last month (October M.A.N.) from Craig Hampson reminds me of countless such letters I've seen in *Model Airplane News* and its sister publications since I began in this hobby, back in the 50s. I wish to add my own voice to that long and hopeful plaint—Keep it Simple. Please don't forget the $\frac{1}{2}$ A sport modeler, or the beginners. We're not the guys with big bucks and 50-acre fields to fly Giant Scale, jets, and the latest-tech control systems. But we do fly.

GARY BULLOCK
Pepperell, MA

Rolling, Rolling, Rolling

If ever any truer words were spoken, I haven't heard them. Your editorial in September *Model Airplane News* leaves no doubt in my mind (and I don't think in anybody else's) what we model-builders are all about. Keep up the good work, and keep those issues rolling....

ROBERT DIXON JR.
Waverly, NY

Just want to compliment you on the fine October issue with its coverage of the "electric revolution." Press on!

C.D. DEAN
Washington, DC

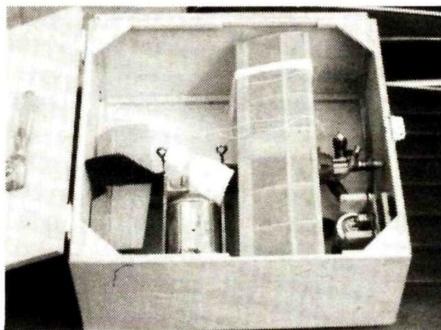
Ad Nauseum

I recently received my July issue of *Model Airplane News* and was really surprised to see the extensive article on the Globe Swift, my favorite small plane bar none. In the 50s-60s my brother-in-law and I flew all over the country in his own—it never let us down. It had a 125-horsepower engine, quite a bit more than its original-issue 85-horse. I'm back in the model game after a forty-year hiatus and I'm ready for scratch-building, or an attempt at it. The one and only fault I find with your magazine is that some of your advertisers run a big ad, which I order from right away because of an attractive price—but they're always out of the

thing! I'm not sure, but I think it's a case of false advertising. I did write the supplier about the problem, yet they didn't have the courtesy to respond.

RAY RUSSEL JR.
Spokane, WA

Your comments about the Swift and your experiences in it parallel my own. I too love the design. Perhaps one day I'll get the bug and design one. Wouldn't the new four-cylinder OS engine be something great to put in it? So far as I know, there are no plans out on it in $\frac{1}{5}$ - or $\frac{1}{4}$ -scale. As far as your complaint about the mail order houses, it's nothing new. Unfortunately we have no power to force anyone to sell their products as advertised. The real force lies with you and the degree to which you push your complaint. If we receive enough complaints, we can bar an advertiser from running a certain ad. In your case, since you didn't mention the name of the advertiser with which you're having trouble, I see no way to help. Thanks for writing, and welcome back to modeling. DBS



Smallest Steps Yet

Having created lots of transport problems with my big models, I decided to build something smaller—much smaller. The result is a Tee Dee .010-powered 8-inch-span biplane weighing 40 grams. To make transport easier, I designed a box for the model containing, spare glow plug, akkus, tools, lines and fuel. Now I let my family have the car as I can easily cart my goods by motorcycle.

HANS RABENHOJ
Stensballe, Denmark

Joe Ott Legacy

I liked your novel approach to Joe's obituary—the manner in which your D.I. established self-identity among his recruits. It was thought-provoking. If everyone were to look inward, each would find something that distinguishes one's self from the others. A nice thought. I shall look forward to reading the November issue of *Model Airplane News*. Again, thank you for the fine tribute to Joe.

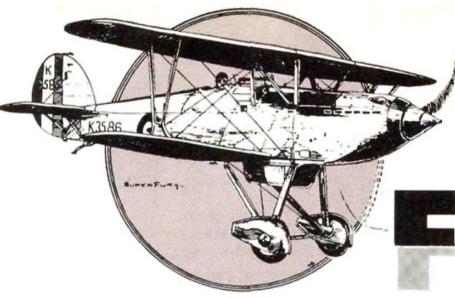
MRS. JOE OTT
Niles, IL

Keep it Small

I'm seventy-three and my first model was a Baby R.O.G., circa 1930. Sport F.F. was always my greatest love, then I progressed to R.O. Pulse with an Adams actuator. I also played with the Rand. Now I'm using an MRC Vector 4, but I have no use beyond R.E.M. The point I'd like to make is, why use a truck to get the stuff to the field? Going way back, I used a T.V. AC receptacle on the plane, wired to the glow plug, and ATV "cheater cord" and plug. But now I simply install a Radio Shack C-size rechargeable cell on the C.B. wired through a switch to the glow plug: K.I.S.S.(!) If my Pee Wee won't fly it, then a Black Widow will. My largest engine is an Enya .15. I see no need to go larger than a .19. In fact, one can go four channels today easily with an .049, only I never did see a practical throttle on anything less than a .09. I remember the Thermal Hopper—what a wild little mill! Best regards.

C.E. RICE
Littleton, NH

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.



Fifty Years Ago...

by DAN SANTICH

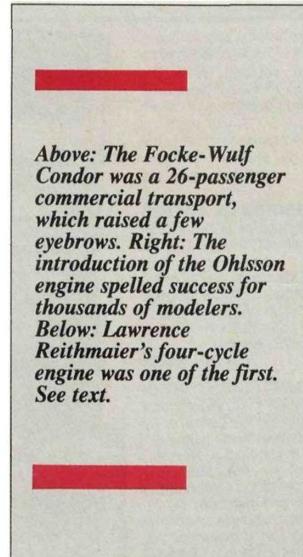


JANUARY 1937 was an uneasy time for Europe and the rest of the free nations. Germany was building more and more war-making aircraft and the Great Powers (England, America, Russia, and Italy) were following suit. It began four years prior when the Hitler government came to power. The British Air Ministry was aware of the impending consequences, but the Chamberlain exchanges with Hitler tended to obscure any hostile intent on the part of the Germans—at least to Chamberlain. Other nations were not so impressed. The development of the Dornier, the Focke-Wulf, the Heinkel, and the Junkers multi-engine bombers with a range of operation of over 1,000 miles left little doubt of their ability to strike anywhere in Europe. It would be a full year before the British would be able to put in the air a bomber capable of retaliation.

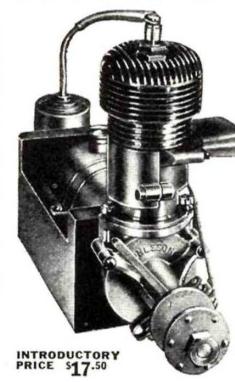
Model Airplane News readers were among the best informed about such matters, as well as what was happening in the modeling world. Carl Goldberg was a highly successful modeler and authored numerous articles for *M.A.N.*, one of which was "Reflections of an Indoor



Above: The Focke-Wulf Condor was a 26-passenger commercial transport, which raised a few eyebrows. Right: The introduction of the Ohlsson engine spelled success for thousands of modelers. Below: Lawrence Reithmaier's four-cycle engine was one of the first. See text.



ANNOUNCING THE NEW OHLSSON RADIAL MOUNTED MOTOR



INTRODUCTORY PRICE \$17.50

Send Money Order

or send 3c stamp to cover postage on booklet showing complete parts and pictures of this marvelous new motor.

DEALERS

Territories are now open. Write for details.

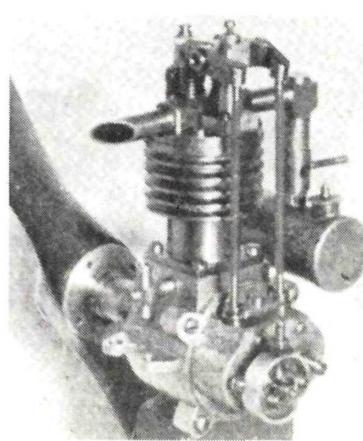
Ohlsson Miniatures introduces to the motor field an entirely new gasoline engine designed and built with the same precision as the motors used in government and commercial planes. RADIAL MOUNTING, an exclusive OHLSSON feature, gives added strength, better balance, and protection against serious crack-ups. This motor has been "proven" by actual test under every flying condition.

SPECIFICATIONS

Bore $\frac{1}{8}$ " Stroke 15/16" 1/5 h.p., Speed 500-7500 R.P.M. Bore engine weight 6 lbs. flying weight LESS batteries 11 oz. 3-point radial mounting for greater strength. Alloy-steel cylinder, electric furnace heat treated pins. Dural connecting rod and provided efficient cooling. Drop-forged 1-beam connecting rod with tubular steel floating type lapped wrist pin. Fully counterbalanced pin-pins. One piece CRBN-SHAF, takes up play in shaft wear. Manifolds accurately die cast may be removed for periodic examination. Crankcase die cast and removable. Motor allows for bearing replacement without purchase of new crankcase. 2-oz. special brass gas tank allows 18-22 minute flights, depending on speed and mixture. Case and propeller required. All parts interchangeable. Precision finished parts with tolerance to .001". All parts completely interchangeable. 2/4 oz. bakelite case coil furnished with each span. Each motor is tested and factory tested before shipment with POSITIVE GUARANTEE. Sold only as a completely assembled unit.

(OHLSSON)
MINIATURES

630 NORTH ALVARADO STREET
LOS ANGELES, CALIFORNIA



Model Champion." Engines for gas-powered models were selling quite well, with the Baby Cyclone, the Brown Jr., the Ohlsson, the Bunch, and the G.H.Q. leading the way. Lawrence Reithmaier of Oak Forest, Illinois, designed and built one of the first four-cycle model engines. It powered his 9-foot-span model, had a $\frac{1}{8}$ -inch bore and a 1-inch stroke, and turned a reported 3,500 rpm.

Modeling was growing rapidly, and those involved would help this country years later in a struggle for freedom. But in January 1937, nothing could be further from their thoughts, and *Model Airplane News* was there to tell about it. ■



Control Tower

by CHARLIE KENNEY



THIS MONTH I have another new radio for review, World Engines'* Expert seven-channel digital proportional FM radio system. The radio is from Korea and has many features. The particular radio I received for evaluation operated on channel 38, 72.550 MHz (orange-grey). Let me highlight some features for you. The transmitter has seven channels, all with servo-reversing, dual-rate on aileron and elevator, rudder-aileron and elevator flap mixing, and adjustable length and tension on the control sticks. The receiver features a dual-conversion front end for narrow bandwidth performance. Servos are water-resistant and have high-output torque. The set arrives in an attractive box with protective styrofoam container. The system as received consisted of transmitter, receiver, four servos, switch harness with novel built-in charging jack, Ni-Cd batteries, two servo trays, spare arms and

servo mounting hardware and transmitter neck strap. All in all, it's quite a package from World Engines, and I've seen it advertised at an attractive price. Let's take a look at the features of the set:

TRANSMITTER

- Deluxe body specially designed for greater operability and ease of handling
- New accurate smooth-operating control sticks
- Control stick length and tension adjustment for best feel
- Easy-access servo-reversing switches on all seven channels
- Aileron and elevator dual-rate
- High-efficiency 10-section telescopic antenna
- Elevator flap mixing
- Rudder-aileron mixing
- RF power output meter
- Battery check button

- Neck strap and connector
- Charger connector for Ni-Cd batteries
- Specially designed battery case for Ni-Cd batteries
- Frequency module is changeable (under back cover)
- Electronic trim adjustments

RECEIVER—HP-7RM72F

- Dual conversion for effective image-rejection
- Narrow bandwidth for 1991 standards
- Dual-gate field effect transistor RF amplifier
- Selective squelch circuit
- Voltage regulation
- Locking anti-vibration metal-plated terminal connectors

SERVO—S-25

- New indirect-drive and sealed potentiometer for improved vibration- and shock-resistance

TRANSMITTER—WORLD ENGINES EXPERT

Operating System: two-stick

Transmitting Frequencies: 72 MHz (all) reviewed unit 72.550. Channel 38 orange-grey

Module Change System: Precision module that permits frequency change within the same band (72 MHz)

Modulation System: FM (frequency modulation)

Power Supply: 10.8V (9 Ni-Cd batteries)

Current Drain: 150 mAh at 10.8V

Dimensions: 7.5x6.5x2.5 inches

Weight: 2 pounds 2 ounces

RECEIVER—WORLD ENGINES HP-7RM 72F

Receiving Frequency: 72 MHz

Crystal Change System: Precision crystal module that permits frequency change within the same band (72 MHz)

Intermediate Frequencies: 10.7 MHz and 455 kHz

Power Supply: 4.8V (4 Ni-Cd batteries)

Current Drain: 20 mAh (quiescent)

Dimensions: 2.3x1.6x0.8 inches

Weight: 1.5 ounces

SERVO—WORLD ENGINES S-25

Control System: Positive pulse width control (1.55 ms neutral)

Operating Angle: One side 45° (including trim)

Power Supply: 4.8V (4 Ni-Cd) AA size

Current Drain: 6.4 mAh at 4.8V (neutral)

Output torque: 42 inch-ounces

Operating Speed: 0.24 sec 60°

Dimensions: 1.8x0.8x1.8 inches

Weight: 1.7 ounces



RF section of transmitter is left, encoder right.
Replaceable RF module in center.

I always like to start with the transmitter, the heart of the radio system. The transmitter is constructed of aluminum and plastic. The brushed aluminum and black makes a nice appearance. The transmitter is lightweight and easy to hold.

Let's take a look at the controls, starting at the top left. This is the channel 5 switch and is normally used for landing gear; On (up) is forward, Off (down) is rear. Next to the channel 5 switch are the carrying handle and the 42-inch, 10-element telescoping antenna. On the upper, slanted portion of the front panel are the special controls, starting left to right, the channel 2 or elevator dual-rate (D/R) switch, the forward switch position is On, and back Off. The D/R adjustment pot is located on the rear panel and will be covered later.

Next, moving right, is the channel 6 control-set for flaps. It's a 41-click ratchet pot. It can also be used with the elevator-flap mixer when the elevator-flap mixing switch is On. Moving right, again, is the battery "push to test" button. When depressed, the lower power meter scale gives a terrific battery check. As long as the indicator is in the green, it's okay. If it's in the red, don't fly and charge the batteries.

Moving to the right side of the transmitt-

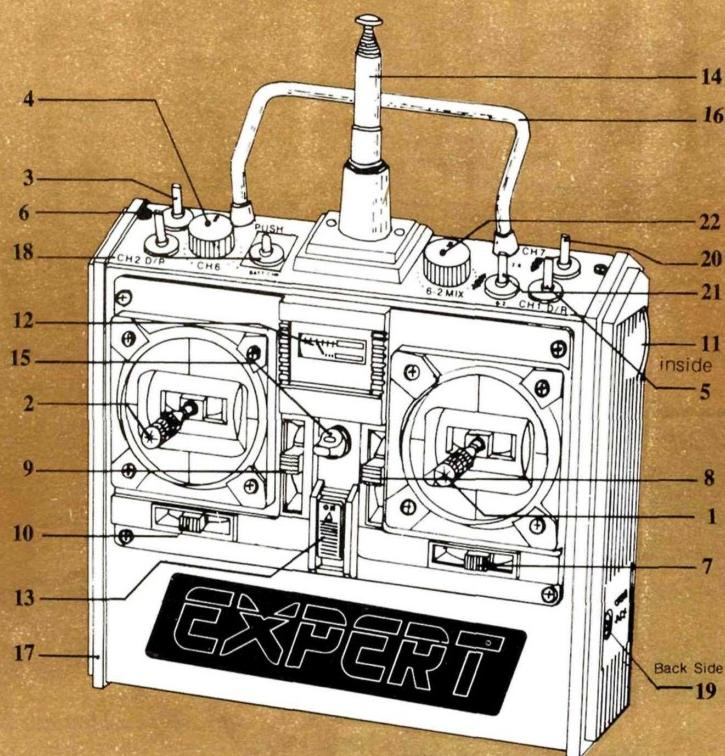
- Water-resistant
- Narrow neutral deadband
- High-impact case
- Four adjustable splined horns

- Strong polyacetal-resin precision gears provide smooth operation and minimal backlash
- Uses Mitsubishi No. 15660 chip



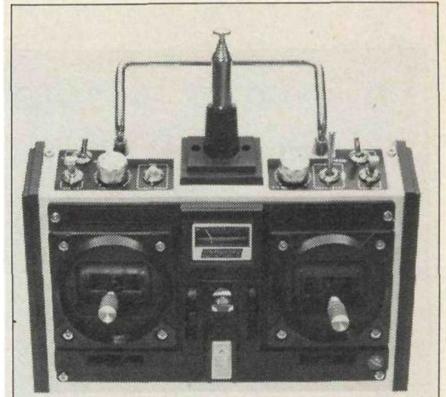
Rear panel controls dual rate and mixing (left), servo reversing (right).

TRANSMITTER FUNCTIONS



1. Aileron/ Elevator stick
2. Throttle/ Rudder stick
3. Landing gear switch (chan. 5)
Used to lower and retract the landing gear with a landing gear servo.
4. Chan. 6; 41 click ratchet
Used as the flap or spare channel.
5. Aileron dual rate ON-OFF switch
6. Elevator dual rate ON-OFF switch
7. Aileron trim
8. Elevator trim
9. Throttle trim
10. Rudder trim
11. Transmitter module (Inside body)
12. Power Meter - Indicates the power supply voltage and RF output

13. Power switch
14. Rod antenna
15. Hook for neck strap
16. Handle
17. Body
18. Battery check switch (4 Channel)
Aileron/Rudder mixing switch (7 Channel)
19. Transmitter NiCad battery charging jack
20. Optional function switch (Chan. 7)
21. Elevator/Flap mixing mode selector ON-OFF-ON switch
22. Elevator-down mixing knob
Set the flap to elevator mixing amount and direction when the mixing switch is down position.
Mixing amount range is 0-100%



Key functional controls are situated on transmitter top.



The dual conversion receiver. Note two crystals and eight-element connector block.

motor and rudder on the left stick, and elevator and aileron on the right. Electronic trim controls are adjacent to each stick.

The balance of the transmitter controls are located on the rear side under a removable cover. The controls are, left to right: The channel 1 aileron dual-rate trimmer—turning the control clockwise allows you to vary the aileron throw from 40% to 100% when the aileron D/R switch is in the On position. The next three controls are the aileron-rudder mixing controls. The aileron-rudder mixing switch is flanked by two pot controls, the 1-4 mix and the 4-1 mix. When the mixing switch is placed in the On position, aileron and rudder move together from the aileron stick in a ratio set by the two pots. This ratio is not adjustable. Next is the 2-6 mixing control, which allows you to set the amount of elevator you want mixed with a given flap movement. To adjust this, the elevator-flap mix switch on the front panel must be set to the 2-6 position. Next, there is the flap-volume control, which allows the desired adjustment of flaps with the elevator.

The remaining controls are the seven

(Continued on page 131)

ter top, there's another 41-click control called the elevator down-mixing knob. This sets the flap to elevator mixing amount when the flap-elevator mixing switch is in the 6-2 mix or the elevator-flap switch is in the 2-6 mix position. The flap-elevator mixing switch is to the right of the elevator mixing knob. This switch controls the aforementioned mixing with the neutral switch position being Off—no elevator-flap mixing. The next control on the upper right side is the channel 1

aileron dual-rate switch—On is forward. Above the channel 1 D/R switch is the channel 7 On/Off switch. This may be used for any desired auxiliary function like bomb drop or smoke, etc. Rounding out the transmitter front panel are the power-battery meter, neck strap loop, power On/Off switch, and two sticks. Both sticks are of the closed gimbal type and operate smoothly. The length of the sticks is adjustable one-quarter inch. Mode II configuration is employed with



Nostalgair **N-3 PUP**

by JIM SIMPSON

THE N-3 PUP is a Piper Cub look-alike built by Nostalgair of Hendersonville, North Carolina.

The first one I ever saw was built and flown by Bobby Counts at Aero Valley Airport in Roanoke, Texas. I knew right then that I had to have one!

Bobby and I were members of the Fort Worth Thunderbirds R/C Club back in the late '60s so he understood and believed me when I spoke of 1/4-scale

R/C. He gave me the three views and literature on the plane; and after watching a short demonstration flight, I was off to begin this project. I figured three weeks would do it. A year and a half later here we are!

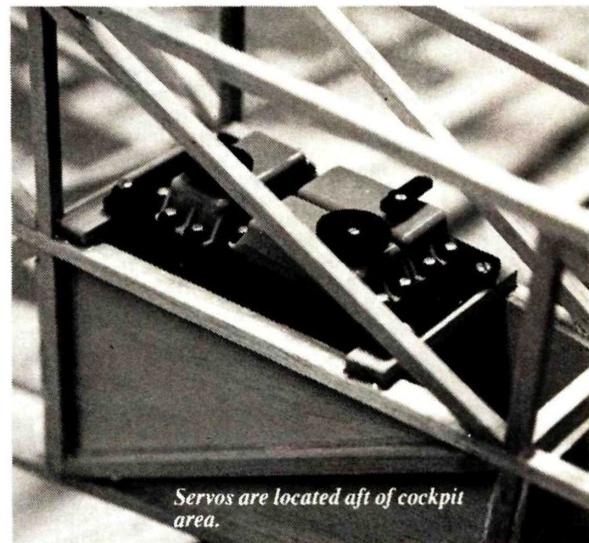
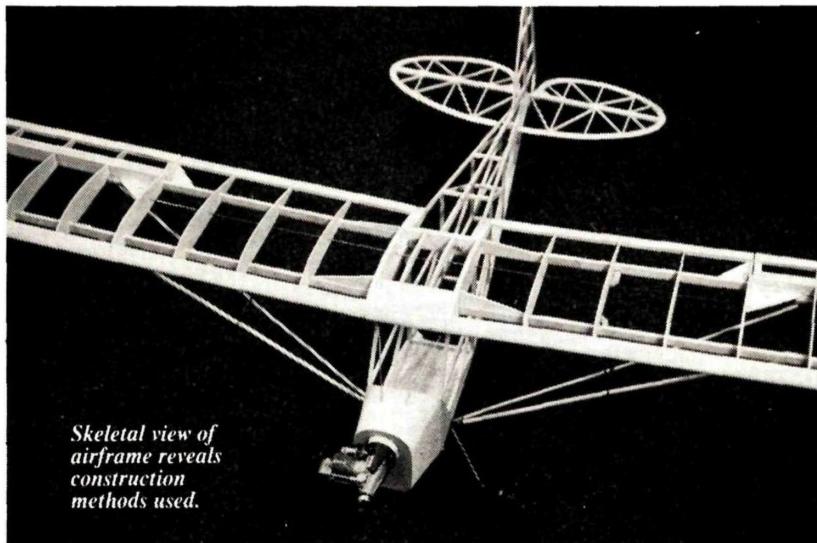
This project is the first in which I drew the plans first. I usually build first, then if it flies good, draw the plans. It's also the first from which I built a second prototype. Finally, it's an absolute winner! The first model



The Spirit of Flight is Reborn

Type: Sport scale
Span: 90 inches
Wing Area: 1,050 square inches

Length: 51 inches
Weight: 7.5 pounds
Engine: .40 to .60



weighed seven and a half pounds and flies with a Saito .90 twin, four-stroke engine. After I discovered how well it flew with one cylinder out, I knew I had to build another one for my O.S. .40 four-stroke engine. The second model only weighs 6 pounds! Remember, both have 90-inch wingspans, and the full-size airplane weighs only 254 pounds empty. Convinced? Good, let's get started.

CONSTRUCTION. A good place to begin is by cutting all the parts, which, thankfully, are few. From $\frac{1}{4}$ -inch sheet balsa, cut the curved pieces for both rudder and elevator. The nose sides and the floor are also $\frac{1}{4}$ -inch sheet balsa. Cut a firewall and landing gear mount of $\frac{1}{4}$ -inch plywood. Use $\frac{1}{8}$ -inch sheet balsa for the instrument panel and wing ribs. Finally, $\frac{1}{8}$ -inch lite ply serves for the eight special ribs, wing tips, carry-through spars, and bellcrank mounts.

Begin the building sequence with the tail. Both surfaces are assembled over the plans. Don't forget to cover the plans with waxed paper. Complete this step

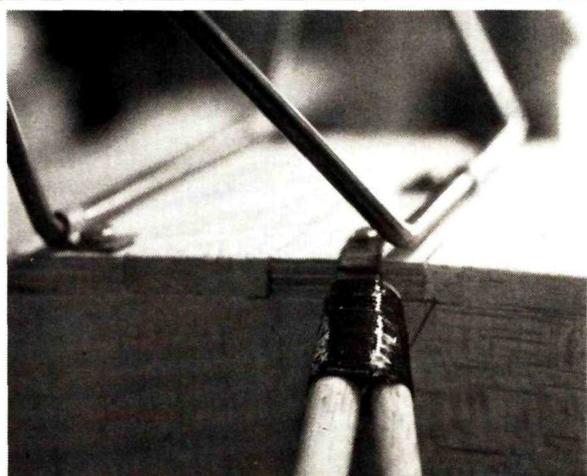
by sanding all edges round and forming the bevel along the hingeline. I prefer to let the covering serve as the hinge but the full-size plane uses typical aircraft hinges.

The next step is to cut and assemble two fuselage sides, aft portion only. Begin with the vertical member directly below the aft wing spar and work toward the tail. When finished, sand both sides of both assemblies, especially the bevel at the tailpost. Cut and sand the correct bevels in all the $\frac{1}{4}$ -inch sheet pieces around the nose.

Use right-angle templates and assemble the two nose sides to the bottom and install the $\frac{1}{4}$ -inch square crossbraces as shown in the picture. Now build the two sides of the door area and leave the second one pinned in position on the plans. Glue the nose box in place with the front end (where the firewall attaches) raised one-half inch above your building surface. Glue the aft fuselage sides in place (tailpost bevel up) and block-up the tailpost $2\frac{1}{2}$ inches above the surface. Next, cut three $\frac{1}{4}$ -inch-square crosspieces to the proper length (over

(Continued on page 20)

Far left: Side-mounted engine gives model realism. Left: Wing struts attach to plywood landing gear support plate.





Coverite's the only company with 5 different coverings

Here's how to pick one that's perfect for your model

Coverite is the only company in the world that makes every type of covering required... whether it's for the Wright Brothers 1903 "Flyer", or a supersonic jet.

Following are the 5 coverings:

Black Baron Film-Hi-gloss plastic film with iron-on adhesive coating. Fully finished.

Super Coverite-Fabric with iron-on adhesive coating. Unfinished.

Permagloss Coverite-Same fabric & adhesive as Super Coverite, but fully finished with factory paint job.

Micafilm-Ultra light, re-inforced film without any adhesive coating. Applied over a Balsarited surface. Fully finished.

Silkspun Coverite-Spun-bonded fabric with iron-on adhesive coating. Unfinished.

To help you choose the correct covering for your next model, here are descriptions of each covering, and its recommended uses.

BLACK BARON FILM

The highest quality iron-on film covering made anywhere in the world.

Proved best in *all* 5 tests: 1) puncture strength; 2) bubble resistance; 3) contouring without wrinkles; 4) adhesion to everything including foam; 5) hiding grain & fillers. Model Airplane News said "...it's great stuff... very easy to work with... able to shrink and eliminate any wrinkles." RCM said "...total lack of bubbles... grain of balsa hidden... finally a wing without wrinkles on the tips... survived dead stick landings along with



the resultant trip through the weeds, without any damage."

Colors: white, black, fire red, cub yellow, flag blue, light blue, orange. Coming: brite red & cream.

Sizes: 27" x 72"

Weight: 2 oz./sq. yd.

Subjects: WWII, Scale Civilian, Military, Gliders, Sport Models, pattern. All beginners.

SUPER COVERITE

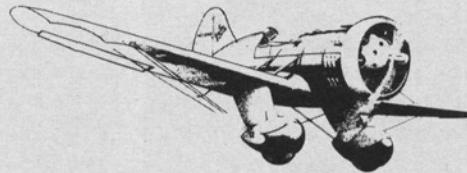
This is the original iron-on fabric covering introduced in 1968, used by more champions world-wide than any other. Looks like finely woven silk, but takes less time to finish because its adhesive coating acts as a filler coat. Unique soft adhesive system makes it virtually goof proof-the choice of expert and beginner alike. Can be finished with a coat of clear producing a translucent effect; or fully painted to simulate the fabric covered aircraft of the pre-WW II eras.

Colors: white, red, yellow, blue, orange, antique tan.

Sizes: 38" x 47" and 47" x 15 ft.

Weight: 2.4 oz./sq. yd.

Subjects: Antique, WW I, early WW II, Golden Era, Old Timers, All beginners.



PERMAGLOSS COVERITE

The one and only iron-on fabric with a completely finished paint job, baked on in the factory oven. 4 coats of no-scuff, 100% fuelproof paint in an authentic satin gloss shine. Finished weight is far less than painted fabric. Same fabric & iron-on adhesive coating as SUPER COVERITE. Can be used to trim itself in multiple color designs eliminating the need to paint.

Colors: white, black, dark red, brite red, dark blue, lite blue, cub yellow, orange, cream.

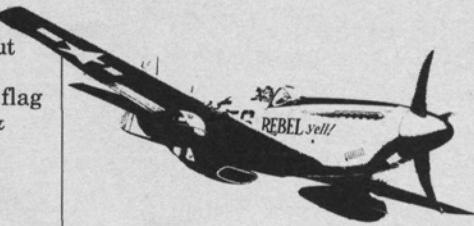
Sizes: 38" x 54" and 38" x 25 feet

Weight: 2.4 oz./sq. yd.

Subjects: WW II, Scale Civilian, Military, painted metals, All beginners.

MICAFILM

An iron-on film reinforced with extremely thin but very tough mica fibres. Yet is less than $\frac{1}{2}$ the weight of other films. On the Elmendorf tear strength machine, Micafilm scored a remarkable 14.1 against 1.69 for its nearest competitor. Actual weights range between $\frac{3}{4}$ ounce per sq. yd. for the clear version to $1\frac{1}{2}$ ounces for metallics. Unlike all our other coverings, Micafilm has no adhesive coating. To



apply, brush Balsarite on the wood surfaces, wait a few minutes til dry, then iron down.

Colors:

Translucents: red, yellow, blue, orange, clear and pearly white.

Opaques: pearly white, flat yellow, metallic red, metallic blue, the only authentic looking aluminum around and Pre-Primed for the painted metal look.

Sizes: 29" x 65" and 29" x 16.4 feet

Weight: from $\frac{3}{4}$ oz. to 1.3 oz./sq. yd.

Subjects: Gliders, Electrics, Old Timers, Aluminums, All painted metals.

SILKSPUN COVERITE

Looks like tissue, but is actually made of spun-bonded fibres that iron-on and have extraordinary tear strength. Same iron-on adhesive coating as SUPER COVERITE. Especially recommended for sheeted surfaces where it goes on 100% bubble-free. Can be finished with a coat of clear to duplicate the old-timer's tissue and dope; or fully finished with paint to achieve a smooth painted metal appearance.

Colors: white only

Sizes: 38" x 54" and 38" x 25 feet

Weight: 2.4 oz./sq. yd.

Subjects: WW II, Scale Civilian, Military, painted metals, All beginners.

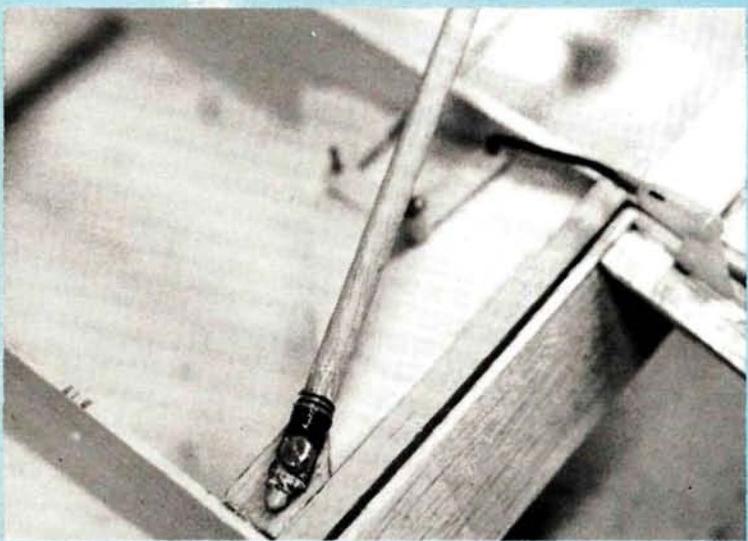
For a free copy of our new **Black Baron Guide To Covering** containing additional information on all of our iron-on coverings including a chart showing recommendations for 47 popular model airplanes, write to Coverite. However, you must include a stamped, self addressed envelope.

COVERITE

420 Babylon Rd., Horsham, Pa. 19044

(Illustrations by Robert S. Cooper
(219) 872-5900)

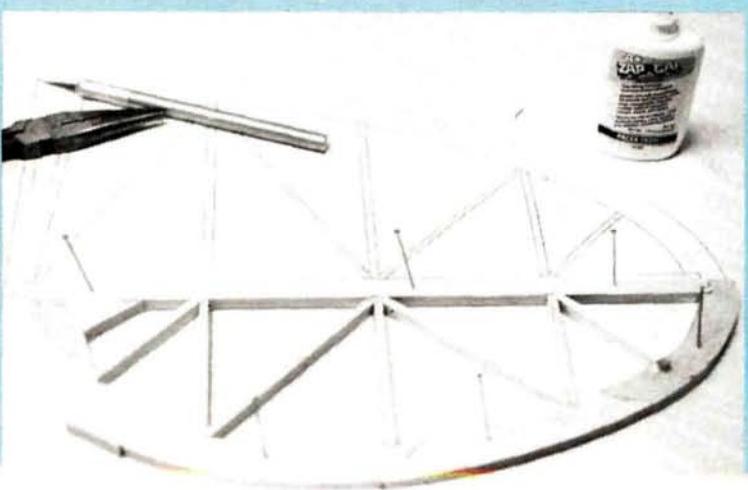
N3 PUP



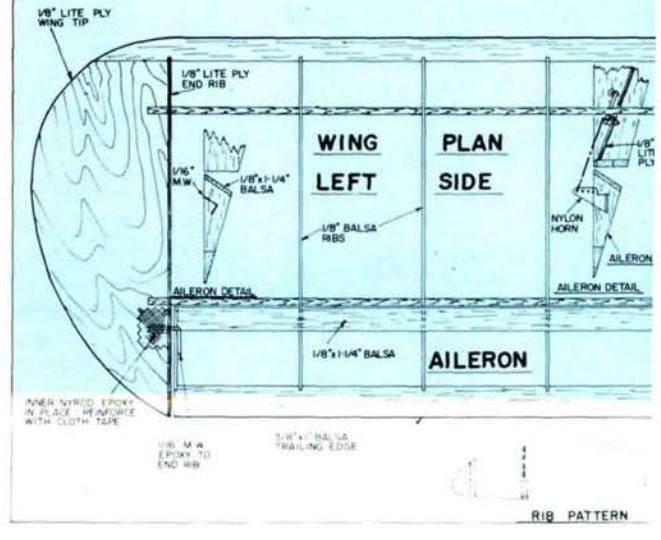
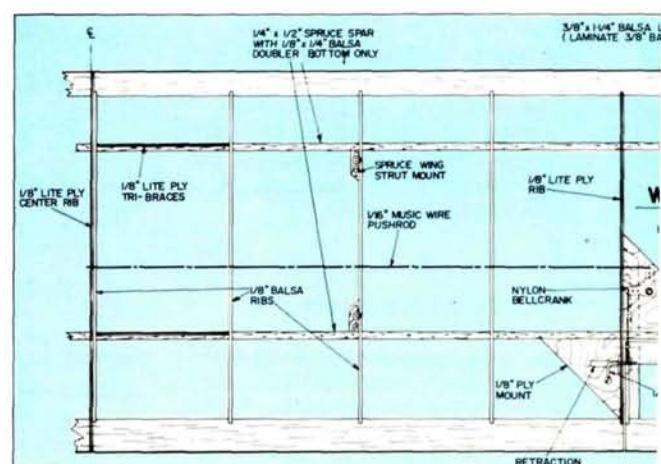
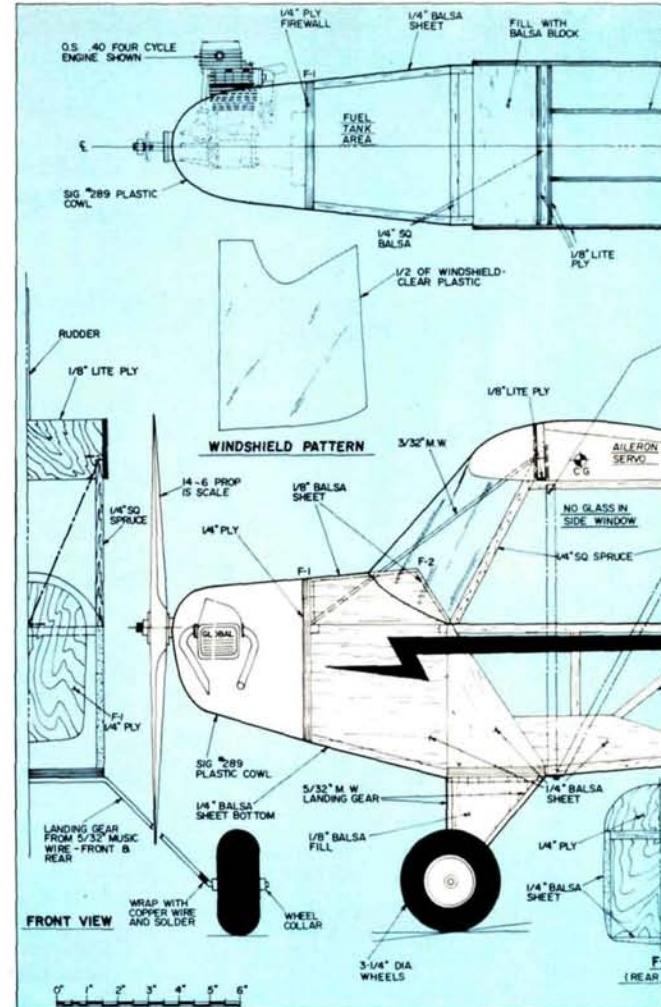
Screws hold wing struts in place on lower side of each wing panel.



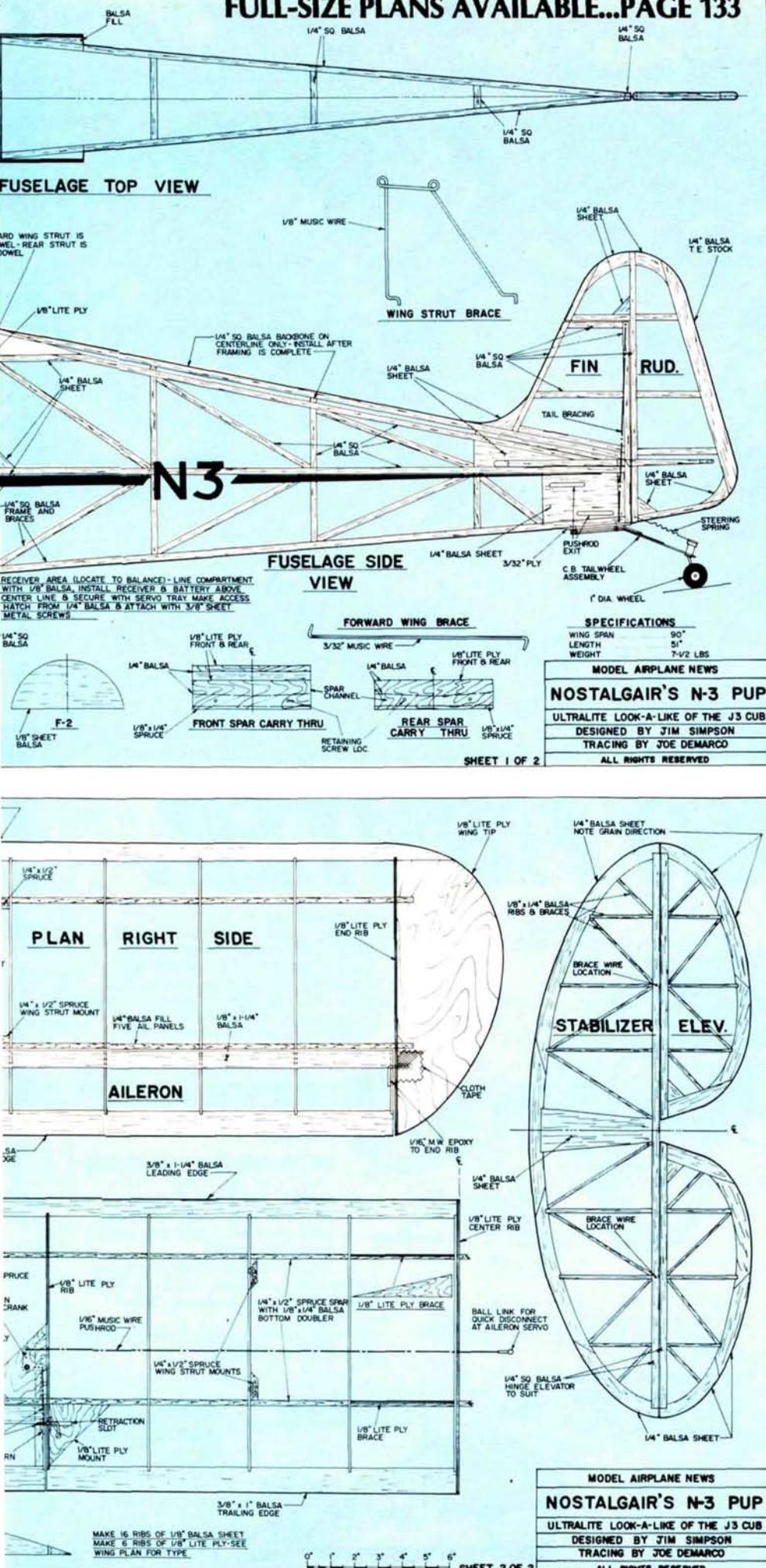
C.B. tail-wheel assembly mounts to 3/32-inch plywood mounting plate.



All flying surfaces are built-up, but are relatively simple to do. Saves weight.



FULL-SIZE PLANS AVAILABLE..PAGE 133



(Continued from page 17)

Touch-and-go landings are the great joy of flight.

top-view of cabin) and add the remaining fuselage side. Carefully cut the cross-pieces to length over the top-view, and glue them in place on the fuselage assembly. When dry, remove from the plan and double-check the alignment. Pretty sight, isn't it? This is just like a big rubber-powered plane!

Select a perfectly straight balsa stick and pin it in place across the front of the fuselage where the firewall will go. Be sure it is centered. Carefully measure the distance from the tailpost on each side. When satisfied that they're even, stand the fuselage in place on the firewall and glue it down. Use strips of cloth to reinforce the joint as illustrated.

Decide now if you want to change the dihedral, otherwise, build-up the spar carry-through assemblies as sandwiches with balsa and spruce-in the middle and lite-ply top and bottom. Be careful to keep glue out of the channels. Select spar stock and trim the inboard ends for a snug fit in the channels. Hint: it's okay to round the corners slightly where they fit in the channels to prevent binding. Also, notice the retaining screw locations. It's easier and more accurate to drill these holes after the wings are complete and in place with dihedral adjusted—that is, if you have a long drill. If not, get one!

Fasten the carry-throughs over top-view of the plans, being mindful of fit and alignment, then add the lite-ply end ribs and the balsa false ribs which support a plywood servo-mount plate in the center. Add the sheet-balsa rib doublers on inside of lite-ply ribs aft of the rear spar carry-through. Now glue this assembly in place on top of the fuselage cabin with front spar carry-through butted up to the front cabin uprights. Bend the two wire braces to the shape shown on the plans and securely epoxy in place at the firewall and front spar carry-through. Fill the area between the ribs in front of the carry-through with scrap balsa and sand to airfoil shape.

After fitting the windshield, cut out center portion of fill to match the windshield contour. The full-size plane has no side glass. Glue the instrument panel

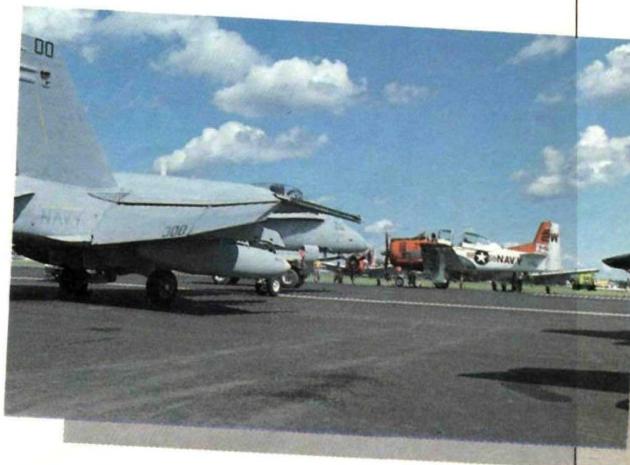
(Continued on page 131)

OSHKOSH '86

*O*KAY, airplane lovers, it's time for your introduction to the way things are done "on the continent." I'm assuming you've already acquired your blood-red Ferrari, own a closet full of Don Johnson-style clothes, and **GQ** is the only other magazine you read besides **M.A.N.** Now, to complete the illusion you must speak a language reflecting the suave, sophisticated new you. Okay, follow along...say *Fray Chay Tree Ko Lorry*, again...*Fray Chay Tree Ko Lorry*. Magnifico, you've just said "three colored arrows,"

which may not impress that beautiful Italian woman you've been hitting on, but it sure thrilled all of us at Oshkosh '86!

Frecce Tricolori is the name of the Italian Air Force's aerial demo team, one of the key



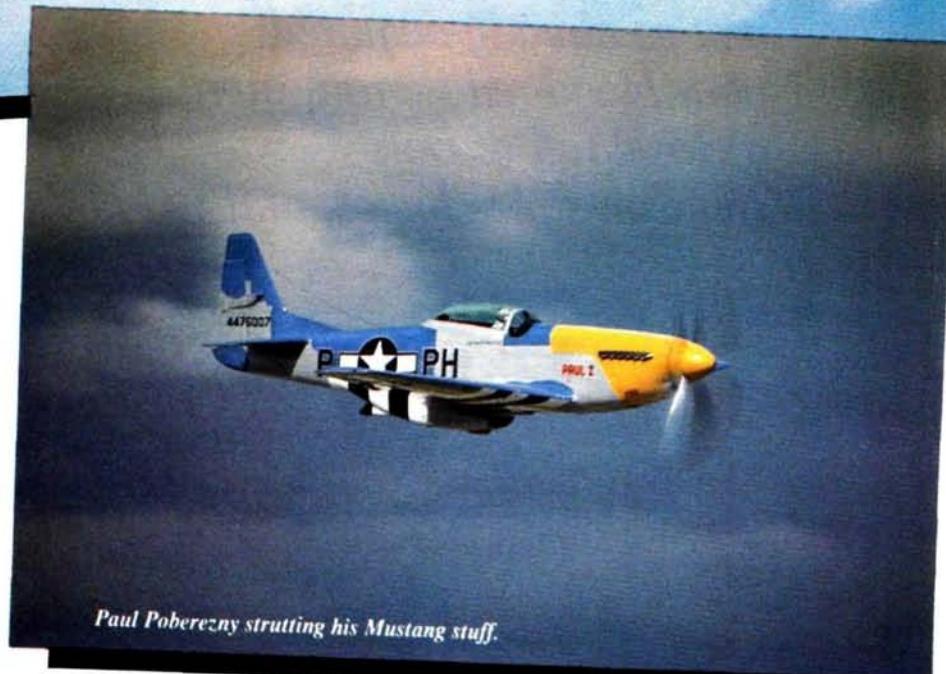
by RICH URAVITCH



Frecce Tricolori team in formation.

photography by RICH URAVITCH

performers at this year's version of Oshkosh. Tooling around in their Aermacchi MB-339As, this group of pilots does things with airplanes that you're not likely to believe. The formation consists of nine aircraft plus a solo, Capt. Gianbattista Molinaro, who does Lomcevaks with his MB. Trailing red, white, and green (Italian national colors) smoke, these guys fly a sequence of well-choreographed, perfectly executed maneuvers that leave even the non-air minded spectator (if such a person exists) applauding. And that, my friends, is just the beginning of the aero adventure called Oshkosh.



Paul Poberezny strutting his Mustang stuff.



Two of the Italian teams' Aermacchi MB-339As.

This makes my fifth year of attending this extravaganza so I now look upon it as a reunion rather than an event. Lots of the same folks, airplanes, and food, but always enough new and exciting that it never gets old.

Some of the highlights of Oshkosh '86, in addition to Frecce Tricolori, were the daily demos of the USMC AV-8B Harrier VTOL fighter. This you have to see to believe! It's also an easy airplane to photograph 'cause it's hovering!

Not to be outdone, the Navy dispatched a pair of F-14A Tomcats to reside on the field for most of the week. While the movie *Top Gun* certainly introduced the non-aviating public to this awesome airplane, to see it perform "live" a couple of



Goodyear blimp being observed by Ford Model T.

hundred yards away I won't soon forget. Since this is the 75th anniversary of Naval aviation, the "boat boys" took the opportunity to show off to everyone's enjoyment. Even all the privately owned, Navy-marked T-28s formed up for an impressive fly-by.

On the civilian side, how about a "down in the weeds" high-speed pass by

a B-747, followed by a pull-up that rivaled some of the high-performance fighters? The collection of Warbirds was a scale modeler's delight. My favorite of past years, Ray Stutsman's Razorback P-47D 'Lil Demon, didn't show up this year until after I left, but the marque was represented by a bubble-top D fresh from restoration by the Planes of Fame East. I



Planes of Fame East P-47D bubble-top Jug.



Crowd-awakening WACO in smoking knife-edge.

rode around the flight line for a while with Warbird president John Baugh and our very own Budd Davisson who probably knows everyone at Oshkosh! Once again, his lovely wife Naomi managed his booth while he gave talks, conducted seminars, and generally maintained 2.5 Mach point to point.

On our tour we stopped to inspect a

OSHKOSH



Typical Oshkosh hustle and bustle around line-up of rare aircraft. Budd Davisson photo.

9/10-scale, Ranger-powered P-51B built by Joe Underwood. And, you think we build giant-scale airplanes! Being curious as to why 9/10-scale was chosen since it was only 10% away from full-size, I posed the question to John Baugh who responded with the drawl becoming a Southern gentleman: "He started with the Ranger engine and a big sheet of paper, drew the rudder and filled up the middle with Mustang." Couldn't have said it better myself!

There was something about the Kalamazoo Air Museum's Grumman F7F Tigercat, flown by John Ellis, that whispered, "I'm mean, lean, and the best there is." Self-confidence? You bet. It was awarded the Grand Champion Warbird honors and deservedly so. It's hard to believe, but this particular F7F had its first flight over forty years ago!

A PBY Catalina owned and flown by Connie Edwards was frequently flown for the crowd. This is the same airplane that received national media attention in recent months when it undertook the reenactment of the historic NC-4 Atlantic crossing in 1919. Dumbo never looked better!

We've all seen the results of the Goodyear blimp efforts when loaded with TV gear covering bowl games, World Series, or other special events. Outstanding, right? Well, you ought to see this 192-foot gas bag boogie when Capt. John Moran goes to military power with twin

pumping experience, I wandered over to the area of the EAA museum, which was naturally packed, but the displays are laid out extremely well, minimizing traffic and even allowing some pictures.

There are some truly historical airplanes there, along with artwork, bookshops, workshops with ongoing projects, plus movies, which, although I didn't get to see them, are said to be outstanding. The newly established reference library is likely to be welcomed by both full-scale and modeling buffs alike. Just across the path is Pioneer Airport, which, if it weren't for the modern EAA Museum building in view, could easily make you believe you've been teleported to the Thirties. The proper airplanes, the proper trappings, the grass strip—it's all there, dotted with Ryans, Monocoupe, Culver Darts, and other white-scarf, cigarette-holder, riding breeches-era atmosphere.



Left: Ed Johnson trying on his Bud Light BD-5J. Bottom left and below: Tight formations and precision flying of the nine Italian Air Force's aerial performers mesmerized the crowd.

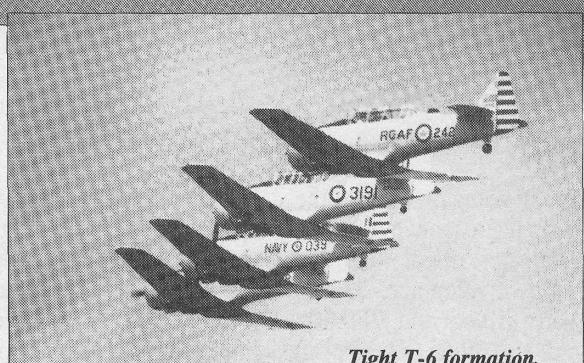
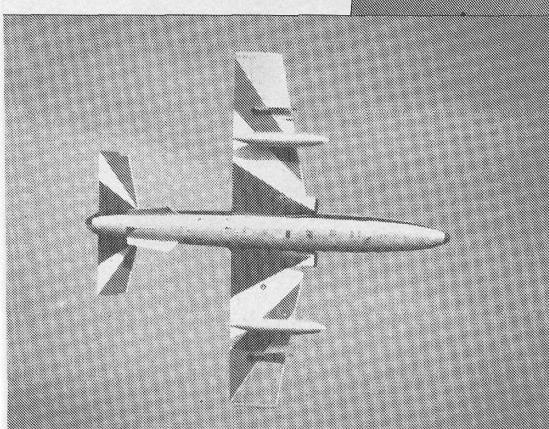
210-horse Continentals, drops the nose a couple of degrees to lose some drag, and performs an on-the-deck dash! I'm talkin' awesome! It may cruise at 35, but I'll bet Vmax is *at least* twice that!

Needing to relax after this adrenalin-

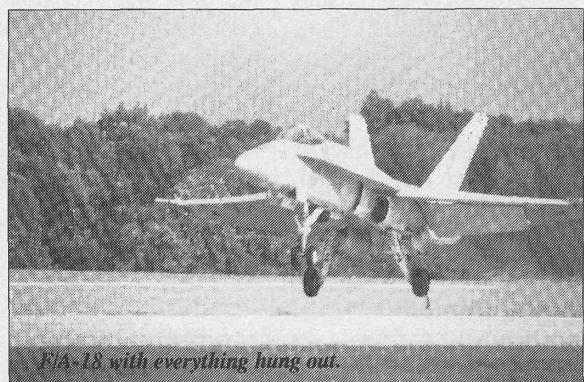


"Top Gun" F-14 during very impressive performance.

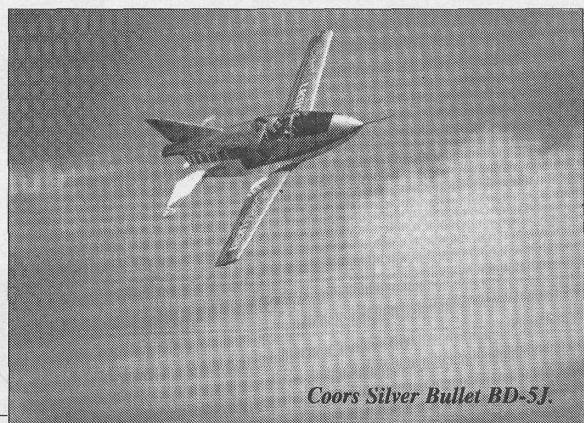
Above: Gene Littlefield bringing new meaning to the term aerobic.
Below: Aermacchi MB-339A in knife-edge.



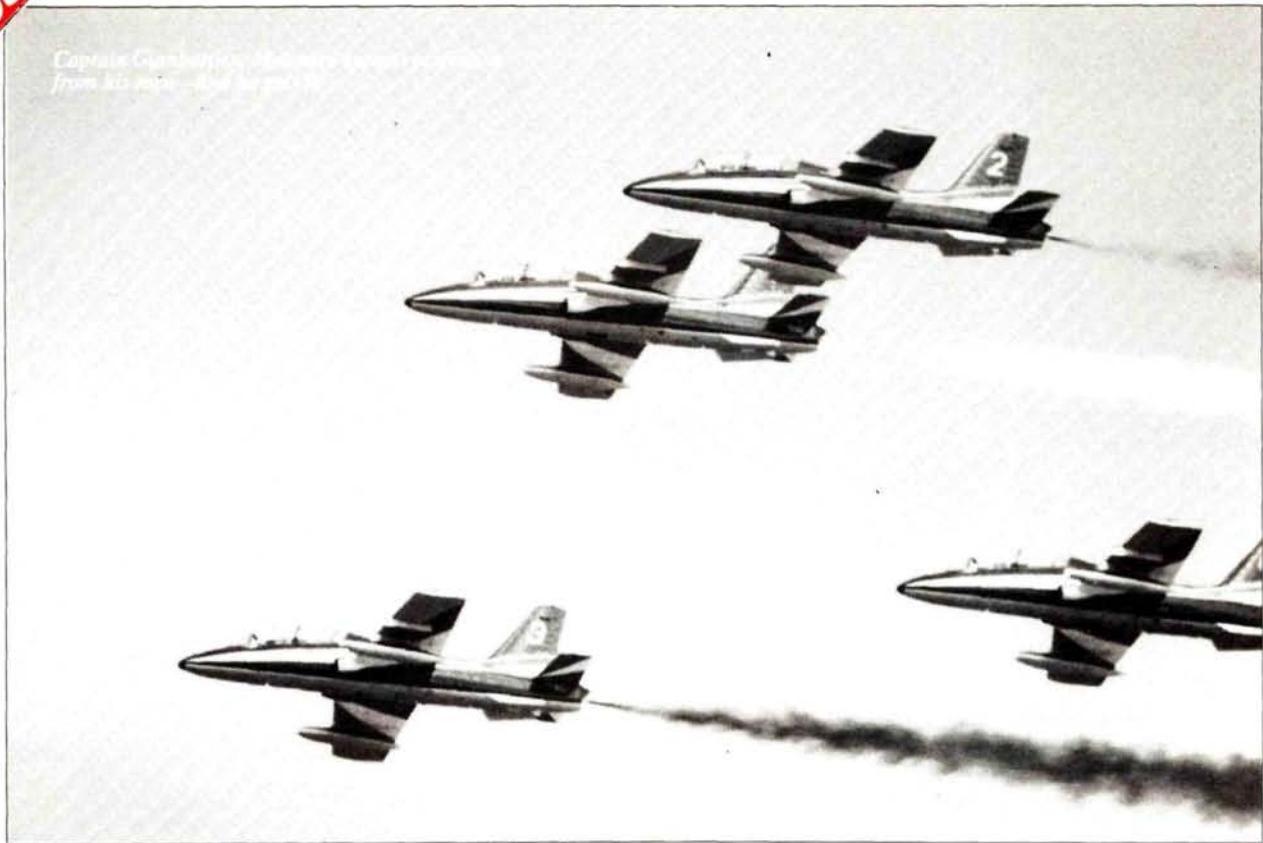
Tight T-6 formation.



Landed with everything hung out.



Coors Silver Bullet BD-5J.



*Captain Gurni
from his notes*

There is so much going on all over the area that it's difficult to convey an impression, but statistics might help put things in a frame of reference: 63,172 hamburgers were grilled and 260,602 Cokes were sold. Nearly 65,000 aircraft movements were recorded during the week by the 15,000 transient aircraft and 1,741 registered show planes. That, friends, by any standard, has to qualify as the biggest aviation event of its type in the world.

Oshkosh is usually host to a number of celebrities and this year was no exception.

Retiring Senator Barry Goldwater was honored for his lifelong contribution to the aviation community. Paul Harvey spoke to a crowd of nearly 10,000 about the EAA, Paul Poberezny, and their impact on general aviation in this country. Bob Hoover, who in my opinion is one of the best, was recognized for his many contributions to the worldwide aviation community. He still puts on one heck of an air show in his venerable P-51.

Attending this event is something every modeler should do at least once, which is exactly what I told myself five years

ago—4,000 photos and four return visits later I'm still shooting documentation for that absolutely perfect scale masterpiece I'll build someday.

I'd like to thank Ms. Golda Cox and her entire group for all the support they provided which made bringing all of this to you a lot easier.

Put this one on your calendar for next year. It really shouldn't be missed! ■

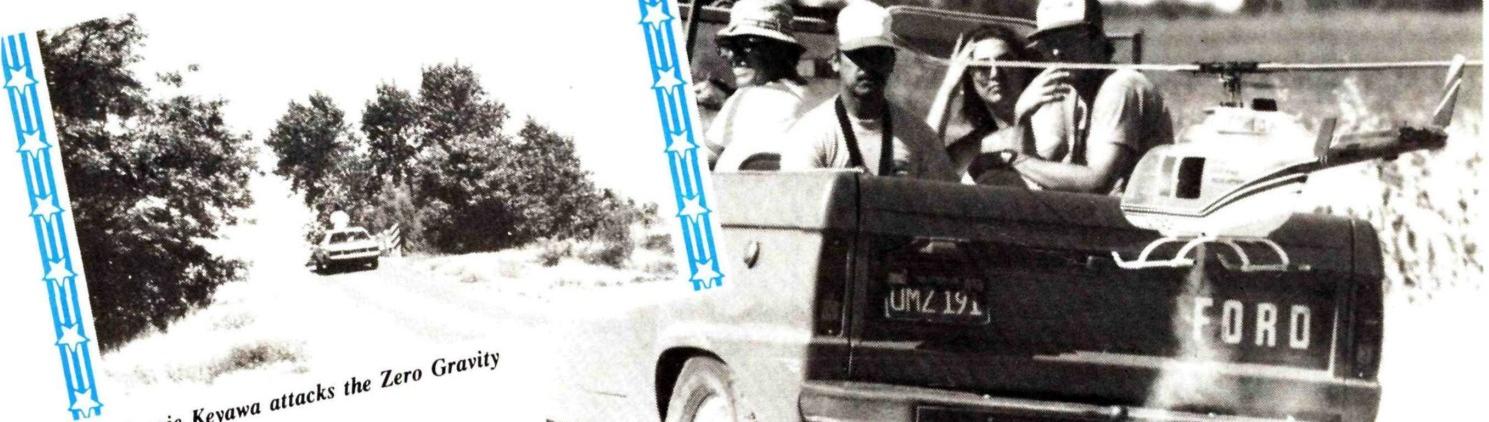


B-25 low pass with Paul Poberezny and Retiring Senator Barry Goldwater doing the piloting. Goldwater was honored for his lifelong contribution to the aviation community.

Great Race 1986

by ED SCHUR

First came the California Gold Rush, then the Sacramento Red Baron's Great Race.



Reggie Keyawa attacks the Zero Gravity Bridge.

Steve Edgar lifts off after one of four refueling stops.

JULY 12, 8:00 A.M.

The course lies quietly in the morning sun. The "Towers of Doom" look smaller, almost benign. Dappled shade lies beneath the "Tunnel of Trees," which is imperceptibly dense. Wild flowers ring the approach to the "Zero Gravity Bridge," and yet, this morning no birds sing, and there is no buzz of insects, on the apprehensive stillness that pervades....

A distant hum and a thousand tiny feet scurry to shelter, dark eyes peering upward from safety.... They are coming!—to dance with disaster! Those magnificent men and their aeromachines, challenging the course in the 19th annual "Great Race." It has begun!

Will Dr. Hook again pit balsa and fabric against cold steel? Will brave Nathan succeed in his dash for the gold?—or will his fragile craft disintegrate, claimed a victim of the course? Will "Radio George" finally defeat "Steiners Oak?"

The Great Race is a 28.5-mile cross-country event, beginning and ending at the Sacramento Red Baron's Aerodrome near Roseville, California. It has become over the years a safe yet challenging test of piloting skills and equipment.

The race traverses a rectangular course through virtually uninhabited areas. Natural obstacles challenge the pilot's speed and navigation. In most cases, a midpoint stop is required at a crop duster strip 18.2 miles into the course.

The flying is done from the rear of an open vehicle. A crew of three accompanies the pilot. A driver, an official pit-stop timer and the pilot's own timer-navigator.

The course cannot be flown in less than 35 minutes flying time, nor more than 50 minutes overall. The minimum time prevents unsafe driving. Winning time is determined by total time en route, established at the field using a flying start and flying finish. En route pit-time is subtracted from total time to insure that the 35-minute flying time is observed.

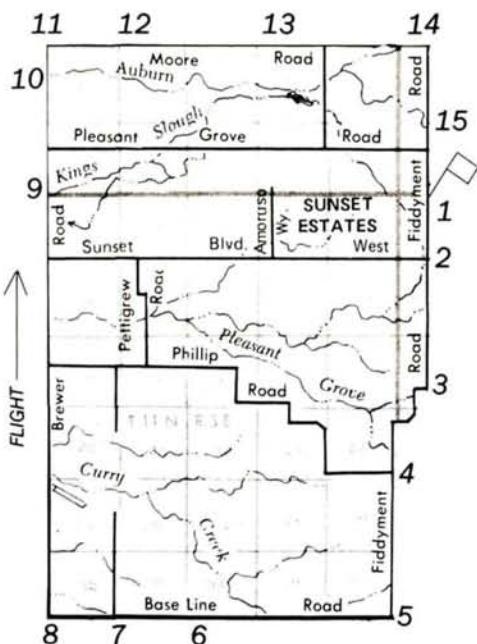
Contestants in the Great Race Special class are required to complete the course without adding fuel and are required to make a landing and full stop at the midpoint. As in other classes, pit-time is determined from the time the first person leaves the vehicle until the last reenters it. It is possible to have a zero pit-time in this class if you can land, stop, and keep your engine running without leaving the vehicle.

"Sport" class fliers contend with the same rules, but must add fuel at the midpoint. This permits those with average sport aircraft to compete. Some of these aircraft require as many as four additional fuel stops in addition to the required stop. The 50-minute maximum en route time weighs heavily on many competitors in this class.

Helicopters, twins, and aircraft types not assumed to be competitive in this event compete in the "Novelty" class and are subject to the same rules as the Sport fliers; however, there is no maximum time limit. No helicopter had ever completed the course until Steve Edgar came up from Modesto with his scale Schluter Long Ranger. He blazed around the course in 55:45 with four fuel stops totaling 11:04 of pit-time. He actually *flew* the course in 44:41, faster than some of the fixed-wing aircraft in the race. He mastered the Tunnel of Trees obstacle by flying at deck-height directly behind his vehicle. It was an incredible performance that earned him first place in Novelty.

"Economy" class was introduced in 1986. The winner is whoever rounds the course burning the least amount of fuel. A 35-minute minimum and 50-minute maxi-

RED BARON'S GREAT RACE 1986



COURSE HAZARDS AND CHECKPOINTS

1. Start/Finish line—Red Baron's Aerodrome
2. Tower of Doom (.5 mile)
3. 2.5-mile checkpoint
4. Second Tower of Doom (5.3 miles)
5. 6.2-mile checkpoint
6. Third Tower of Doom (9.9 miles)
7. Fourth Tower of Doom (10.6 miles)
8. 11.4-mile checkpoint
9. Mid-point landing strip (18.2 miles)
10. Zero Gravity Bridge
11. 19.8-mile checkpoint
12. Fifth Tower of Doom (20.6 miles)
13. Tower of Trees
14. 25.3-mile checkpoint
15. Steiner's Oak, 2 miles from finish

DESCRIPTION OF HAZARDS

Towers of Doom—A series of tall high tension wires and towers that bisect the route.

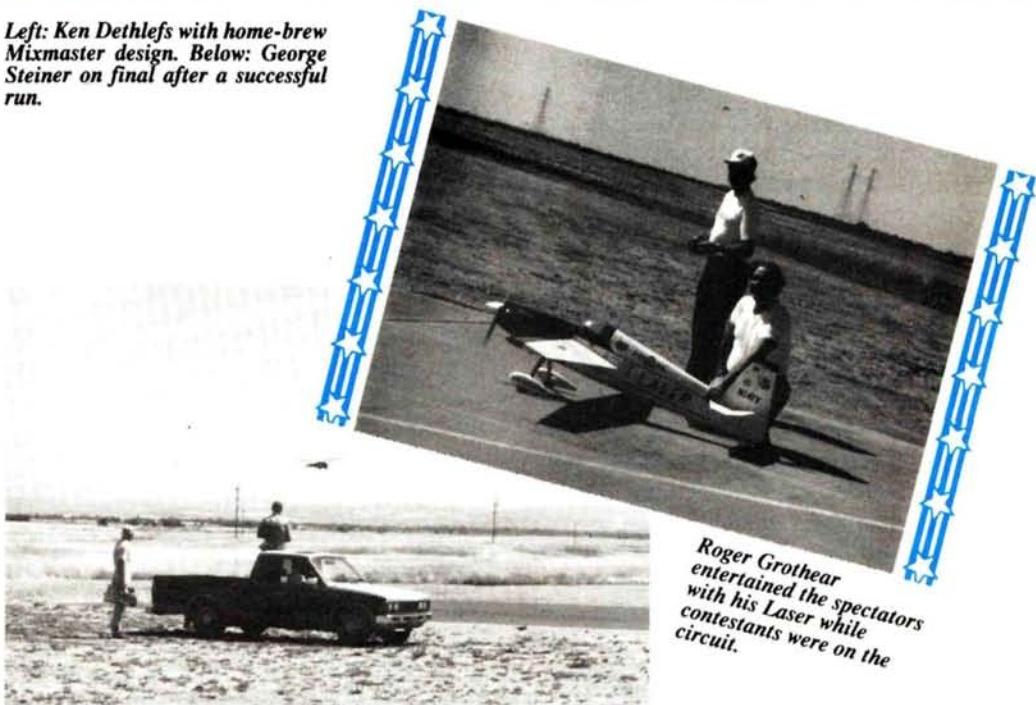
Zero Gravity Bridge—A country bridge that transporting vehicle must cross just after take off from the mid-point landing strip. It has a steep approach, which if traversed too rapidly causes the crew, field boxes, and fuel cans to be tossed out of the vehicle.

Tunnel of Trees—A winding stretch of the course lined on both sides with massive oaks and cottonwoods, resulting in partial sight-loss of the aircraft. The constant turns keep the pilot disoriented throughout the hazard.

Steiner's Oak—A small group of oak trees 2 miles from the finish, but a real threat since pilots are not used to their size or arrangement.

PLACER COUNTY

Left: Ken Dethlefs with home-brew Mixmaster design. Below: George Steiner on final after a successful run.



Roger Grotheer entertained the spectators with his Laser while contestants were on the circuit.

imum time limit is enforced, and no fuel may be added en route. Fueling and defueling is conducted at the field by race officials to determine how much fuel was used. It is certain that the fliers, having now contended with this challenge will show up with some interesting hardware next year.

The Aerodrome takes on a festive air and a Perils of Pauline atmosphere. The gals in the club provide a fantastic champagne breakfast and an equally impressive chili, hot dog, and hamburger lunch. Over 200 meals were served this year with the

proceeds pretty much funding the event. The entry fee for contestants is only \$2, which covers both days of flying and as many classes and attempts one cares to make. Everyone has a good time, and the tall tales that result keep the club talking and laughing for months afterward.

July 13, 5:00 P.M.

A receiver awaits instructions, but none come; servos jitter, seeking a command that isn't there; batteries ebb, and life leaves the little lost aircraft. The Tunnel of Trees has claimed another. Tattered

MonoKote flutters at the entranceway of the tunnel; bits of propeller lie beneath the Towers of Doom—cold steel the victor again. Pieces of helicopter are spirited from the lonely road, destined to decorate a pack rat's home.

The Great Race is ended. If aircraft could have bled, they'd have laid claim to the bloodiest race in history: thirty-three pilots having challenged the course, thirteen having prevailed. Nineteen aircraft were damaged or destroyed, and one unaccounted for....

(Continued on page 88)



Jet Blast+

by RICH URAVITCH

HI, GUYS, miss me? I just got back from Dallas after attending the 4th Annual Southwest Fan-Fly—which I'll present extensive coverage of in a future issue. Suffice it to say that many of you have gotten involved in a big way, and things are really happening.

For this installment, I'll fill you in on some new things, exclusively fan-related, some of which are presently available, others which *could* be made available. A third grouping—which I'm asking you to support by sending your suggestions—is ideas for products *you* see a need for. I'm convinced, based on the type of mail I receive, that a lot of manufacturers read the column and are always looking for potential products. So, if you're sitting on some useful recommendations from which we might all benefit, let's hear them, a simple description or even a sketch should do the trick.

Kress Jets* has a rigid molded-polyurethane-foam inlet extension for their RK-740 fan units. It is said to improve output of the fan considerably. After a whole lot of experimenting in an attempt to quantify static thrust output, it becomes quite clear that a good inlet is an essential that must be recognized if you want good performance. This Kress accessory appears to be a step in the right direction. Also in work is a fiberglass duct which replaces the aluminum part in the 740. This has to yield performance gains because you won't have to trim the rotor as much to accommodate for overlapped aluminum skin. Contact Kress for specifics.

Bob Violett* has come up with a great solution to the fuel storage problem. His "saddle tanks" are standard equipment on the Sport Shark kit and are also available for other applications. These tanks are contoured to allow positioning around the fan shroud. There are lots of advantages to this arrangement, the most obvious being less of a fuel line run so the



New from Hobby Barn is this F-86 Sabre designed for Dynamax and Turbax fan units.

engine run is likely to remain more stable throughout the flight; and there's considerably less CG change as fuel burns off. My package costs \$24 and includes 2-ounce tanks plus all necessary plumbing and fittings.

Larry Wolfe of Jet Hangar Hobbies* is working on a performance kit for his Turbax fans, which includes some redesigned internals. For those of you who didn't catch it when I mentioned it some time back, Larry did much of the model work for *Iron Eagle*. Among the items is a two-holer F-16 (B-model, actually). It's very accurate, uses a JHH fan with no cheater hole, and is the only "Baker" model I know of. Larry says there's no kit available. I can't say for sure, but I'll bet some of you scratch-builders out there might be able to persuade Larry to sell you a fuselage. Larry's FJ-3 Fury version of his F-86 kit got high static score at the Dallas Scale Masters qualifier. He'll be taking it to the Masters finals next.

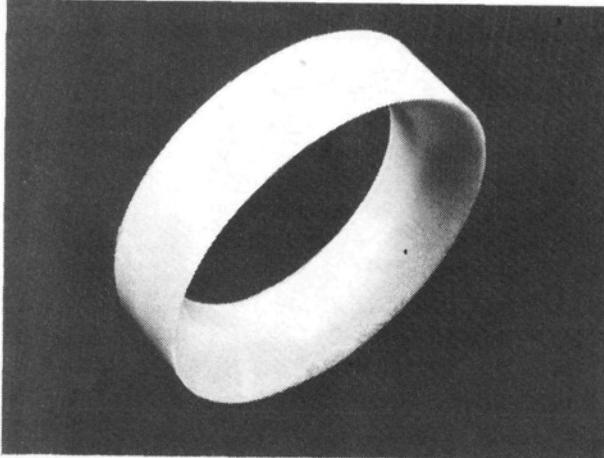
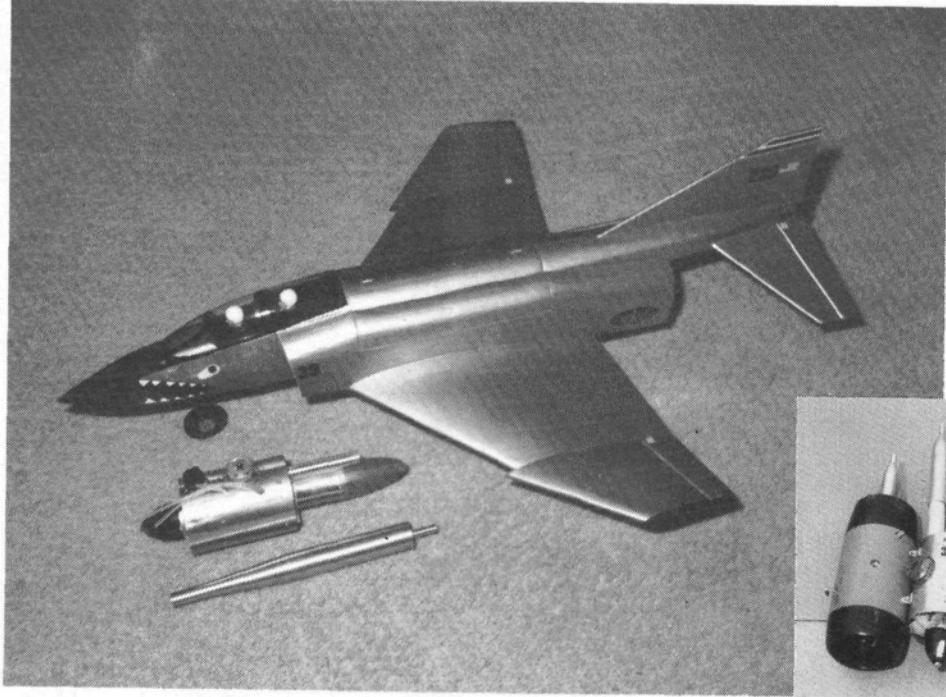
Hobby Barn* is shipping their F-86 Sabre, which is a redesign of the old Zia/Air Forms kit. Designed for the 5-

inch fans (Dynamax and Turbax), it should be well-received. I understand Billy Kerapel Jr. put in some outstanding flights with his Blue Impulse aerobatic version at this year's Byron Jet Rally. I didn't see it myself this year but was impressed last year. I understand the kit is available in a deluxe version which includes glass fuselage, and pre-sheeted foam wings, retract-ready.

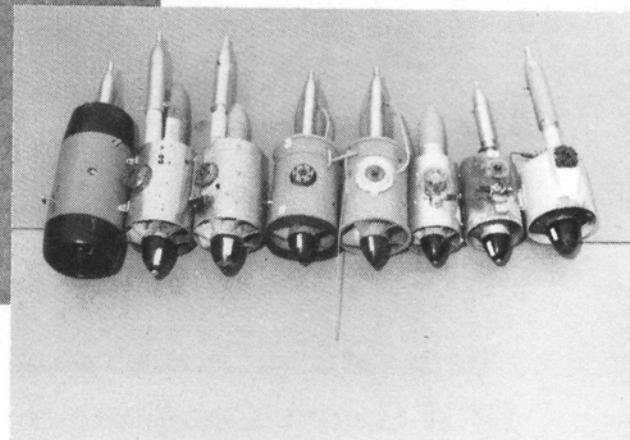
The Ziroli F-4 continues to show up in increasing numbers. Dave Beaudoin of Plattsburgh, New York, sent some photos of his version, which follows Nick's plans exactly. It's his first scratch-building attempt, and as you can see, it turned out real well. Dave's using an RK-740/K&B 7.5 package. Nice work, Dave!

In the same vein, and kind of a coming attraction of the Southwest Fan-Fly IV coverage I'm preparing: I've seen Terry Best's Ziroli F-4 fly. Holy smoke! He's using the home-brew fan based on a Violett rotor cut down to 4½ inches, running inside a length of PVC pipe! He's developed a good, smooth inlet and, believe me, the little hot rod is impressive with enough speed to keep most jet guys

Right: New from Jet Hangar Hobbies is the F-16B. Note cheater hole.
Below: Dave Beaujouin put together this F-4 using Ziroli plans and an RK-740/K&B 7.5 power package.



The Kress Jets rigid molded polyurethane foam inlet extension.
See text.



RK-720 and 740 units used to test the new Kress inlet.

Kress Jets, 27 Mill Rd., Lloyd Harbor, NY 11743.

Jet Hangar Hobbies, 12554 Centralia Rd., Lakewood, CA 90715.

Hobby Barn, P.O. Box 17856, Tucson, AZ 85731.

Bob Violett Models, 1373 Citrus Rd., Winter Springs, FL 32708.

HARDWARE

Basics of Radio Control

by RANDY RANDOLPH

THE USUAL connotation for the word "hardware" includes nails, hammers, and all sorts of metal and plastic fittings for the home. In modeling, the term is very similar, with the possible exception of hammers and nails, and of course the reference to home rather than model airplanes.

A large number of model kits include a "hardware package," which might or might not be complete, and usually is not! With few exceptions the modeler will still have to supply engine mount, fuel tank, and wheels to the very best of kits. This is not necessarily a cost-cutting practice on the part of the kit manufacturer, but rather an effort on their part to accommodate a larger number of modelers and their needs.

Manufacturers advertise their kits as being suitable for a range of engine sizes. Builders with less flying experience tend to use smaller engines, and those with more air time under their belts want the snappy performance that a larger engine provides. The manufacturer designs his kit to perform safely with the larger engine, knowing that it will also perform well with the smaller powerplant.

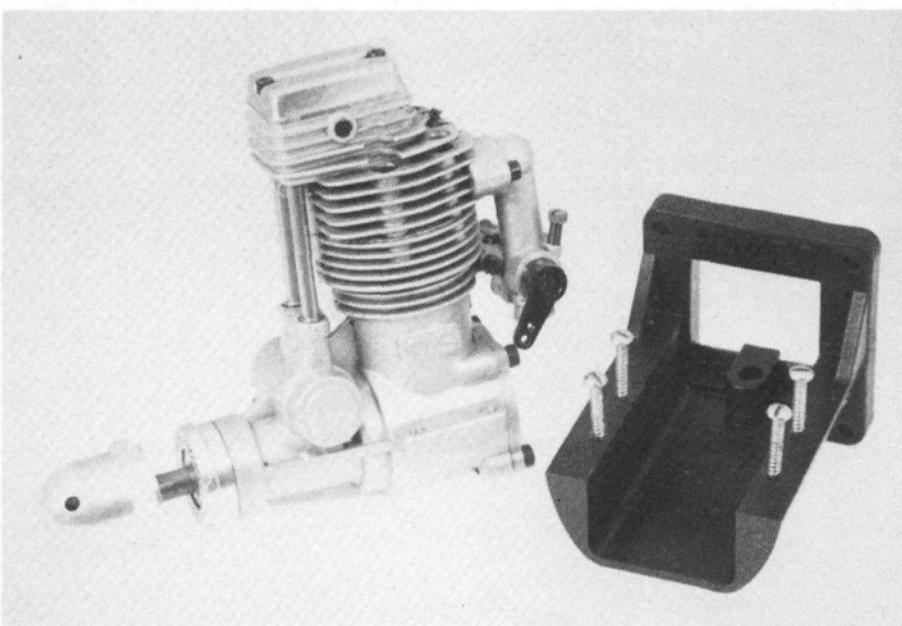
An example might be the airplane kit that is for .20- to .45-size engines. In this range there are a large number of engines, which would take a minimum of five or six different engine mounts. It is quite likely that two different engines in the .20 range would require different

mounts. There is a great difference in mounts between the two- and four-stroke engines of the same, or similar, displacement. As the engines change, the mounts change as well.

Mounts are not the only thing that change with engines. A 4-ounce tank could be just right for a sport .20 engine and just barely enough for a .25. Anything larger than a .25 would definitely need at least a 6-ounce tank, and in the .40 two-cycle range even an 8-ounce job

would not be too much. Then again, a .40-.45-size four-cycle engine could get by very nicely on a 4-ounce tank!

Although changes in wheel size are not as dramatic as those of engine mounts and fuel tanks, there are differences that should be taken into consideration. If the airplane is to be flown with a .20-size engine from a paved surface, it can use somewhat smaller wheels than one that is to be flown from a grass field. The airplane with the larger engine, and larger



Different types of engines require different types of engine mounts. This four-cycle engine needs a longer mount than would a two-cycle of the same displacement.



Above: Wheels are an item of hardware which need to be considered in the purchase of a kit, since most do not provide them. Right: The tank selection in most hobby shops should allow you a tank to fit any airplane.



propeller, will require more ground clearance for the prop with proportional increases in size for paved and grass fields. A $\frac{1}{2}$ -inch difference in the diameter of a wheel can make a lot of difference in the airplane's ability to land and take off from various fields.

The three items I've mentioned require a bit of support equipment to make them function as a part of the airplane. The engine mount must be attached to the firewall, usually with bolts and blind nuts. The larger the engine, the larger the bolts and nuts. The engine must be bolted to the mount, which means bolts that fit the engine and mount, and again, vary with the size of the engine.

When the fuel tank is secured in the tank area of the airplane, it must then be connected to the engine and filler system through a combination of metal tubing and flexible fuel line. The size of the tubing and fuel line will depend on the

size and demand of the engine. There are two sizes to consider in the .20 to .45 range.

Let's not forget the wheels! They must be held on the axles, and by far the most popular way is through the use of wheel collars. But, since we are talking about only one landing gear, only one size of collar is necessary!

The task of acquiring the necessary hardware that the modeler must obtain to complete most kits can offer quite a challenge to the beginning builder. Consider the problem of securing pushrods, clevises, control horns, hinges, linkages, etc., for kits that include a list rather than the hardware...It is only good sense to talk to your hobby shop owner and get his advice when buying that first kit.

Randy Randolph, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

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How To:

by RANDY RANDOLPH

MAKE BUILDER'S TRIANGLES

The triangle that measured 3 units by 4 units by 5 units (the right triangle) was the basis of modern mathematics and was, and is, an absolute necessity for any construction. The photos show how to make a set of right triangles that will stand up by themselves and be quite useful in modern construction.

1. The necessary tools and materials are a builder's or carpenter's square, a pencil, a saw, sandpaper, and a 6x12-inch piece of $\frac{1}{2}$ -inch plywood.

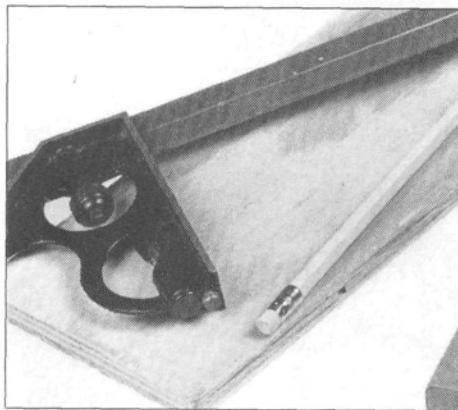
2. The ends of the plywood must be square with the sides. If they are not, mark them with the carpenter's square and a pencil.

3. If the ends are badly out-of-square, saw them square as marked and finish them with sandpaper wrapped around a sanding block.

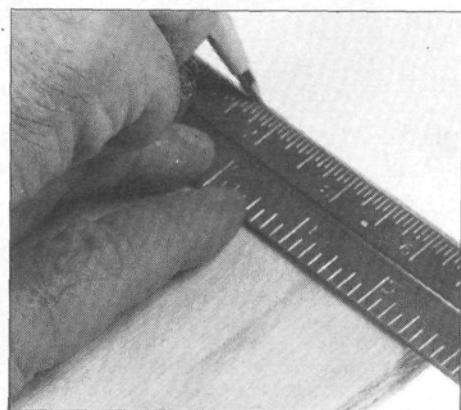
4. Once all sides and ends are square with each other, saw across a diagonal from one corner to the other and smooth all edges with sandpaper.

5. Sand the very tip off of the right angle to allow for a glue line. These triangles are great as jigs for bulkhead installation on fuselage sides.

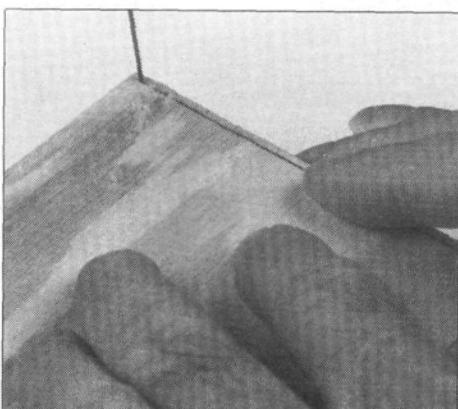
6. Because they stand alone, these triangles are excellent for holding fuselage sides in alignment during assembly. They can be used in any application requiring right triangles.



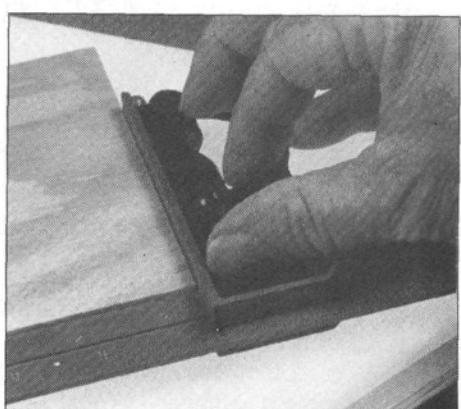
1.



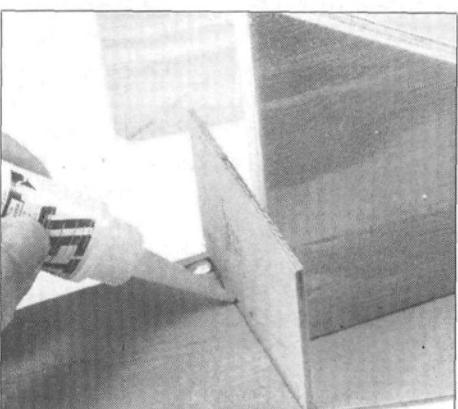
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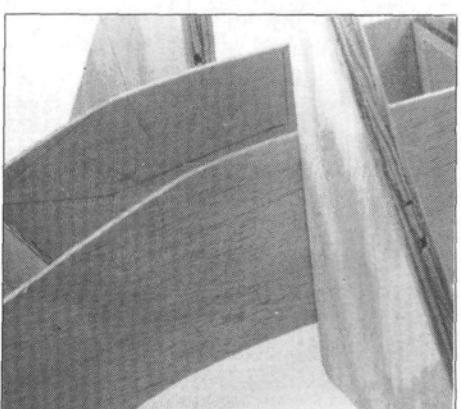
3.



4.



5.



6.



Field & Bench Review

Balsa USA

NORTH STAR

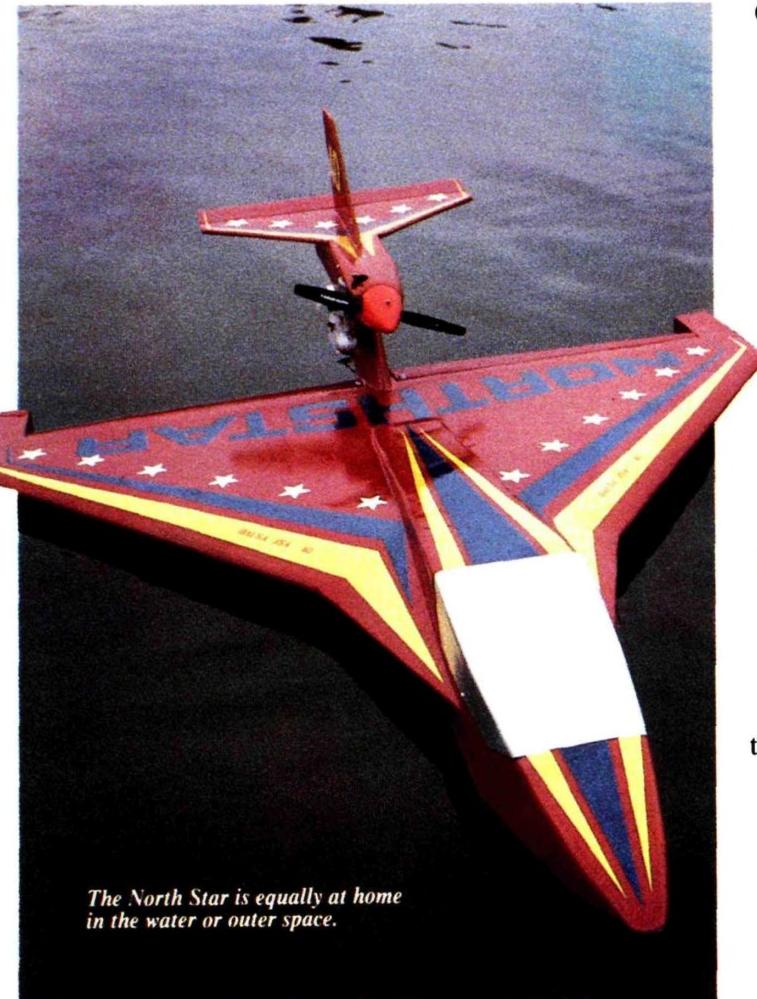
by GEORGE WENDT

A futuristic model that could fly formation with the Starship Enterprise.

THE two most important considerations in selecting a radio-control kit are the kit's quality and how well it will fly. Balsa USA's* new North Star kit fills the bill in both categories.

I've had the privilege of building and flying other Balsa USA kits and have been impressed by them. When I noticed the North Star advertisement in *Model Airplane News*, I had to have one of these planes. It was perfect: good looking and different, yet still a fun-to-fly model. To sweeten the pot, it can land and take off of water surfaces.

THE KIT. When my kit first arrived, I immediately began sorting through it. The packaging was very good and the die-cut parts were outstanding—the ribs just fell out. There were three sheets of plans; one sheet for the wing, one for the fuselage, and one drawing to show the construction sequence, which I found very helpful.



The North Star is equally at home in the water or outer space.

CONSTRUCTION.

The two most important steps in building the North Star are engine down-thrust and balancing. Pay particular attention to the plans and written instructions; it'll make the difference between a good flying model and one short flight. On page 5 of the written instructions, Balsa USA tells you to use $1\frac{1}{2}^{\circ}$ to 2° of down-thrust—use 2° . This will make the difference between getting off the ground or not.

The other most important step involves balancing.

The plane will fly tail-heavy with the power on, but pull the power and it gets interesting, to say the least. Make

sure you balance the model where the center of gravity is shown on the plans. I had to add about 10 ounces of lead to the nose, which seems like a lot, but keep in mind that all the weight is in the tail to start with. I paid careful attention to these two steps and I



Type: Sport

Wingspan: 44 inches

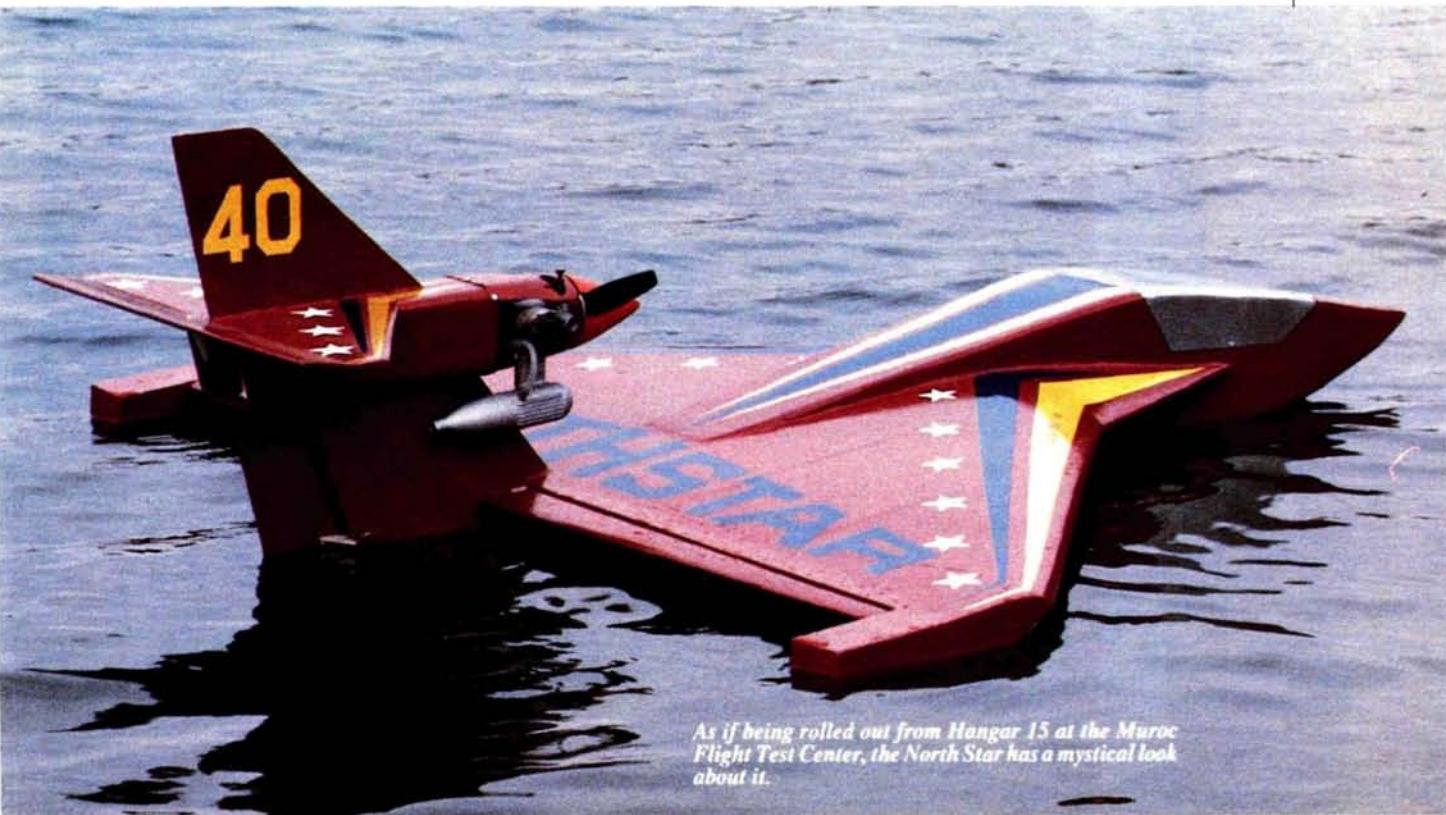
Wing Area: 750 square inches

Length: 54 inches

Weight: 6 pounds

Engine: .40-.46 two-stroke

Channels: 4



now have some 25 flights on my North Star, with no hang-ups. Looking back, the two things I liked best about the building of the North Star were the one-piece stabilizer and full-width fuselage sides.

The written instructions start with the wing. I trimmed the wing spars to their proper length and pinned down the $\frac{1}{4}$ -inch square spruce trailing edges. Using Hot Stuff from Satellite City* I glued them together and added the joiner strips to the center of the trailing edge. Next I had to add the ribs to the trailing edge using Hot Stuff, and then I added the leading edge as per the instructions. Once these steps were complete, I trimmed the $\frac{3}{8} \times \frac{1}{2}$ -inch filler at the trailing edge centerline so the trailing edge sheets would fit flush. Once complete, I added the trailing edge sheet.

Next it was time to add the wing spars. First I trimmed the notches in the rib and glued the $\frac{1}{8} \times \frac{1}{4}$ -inch spruce spars in place with slow-setting Hot Stuff. While that was drying, I cut the leading edge sheeting to fit in the wing later. I turned the wing over on the plan and completed the other side. Using a $\frac{1}{16} \times 4 \times 20$ -inch sheet of balsa, I cut the webbing pieces and installed them.

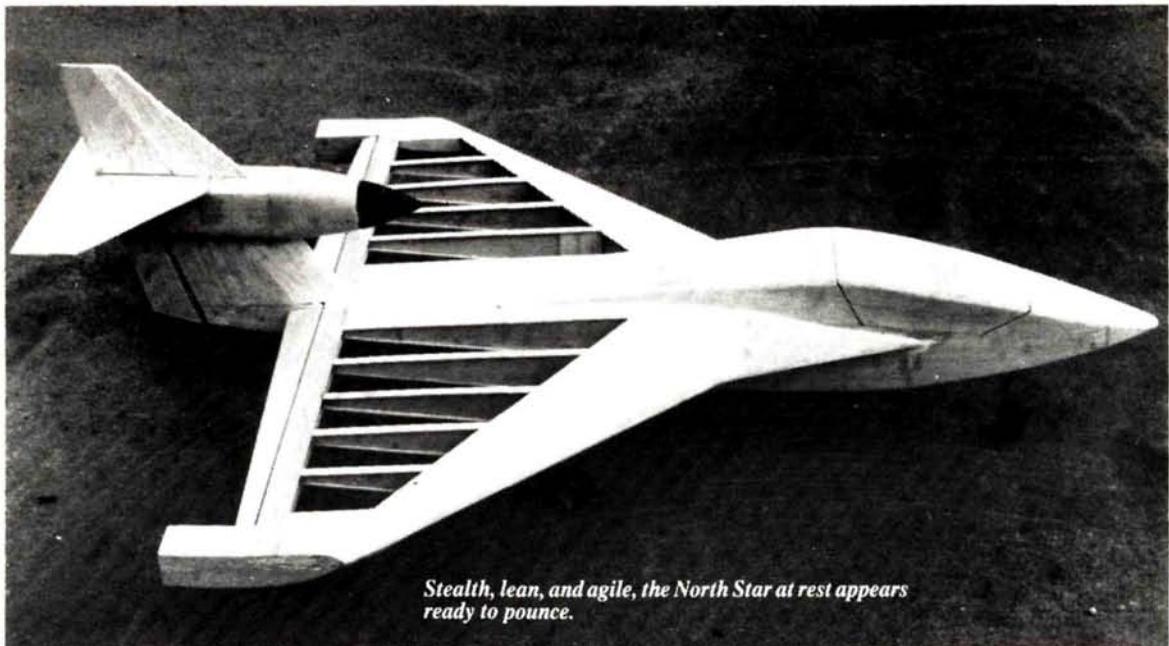
Next it was time to install the landing gear block doublers, and I accomplished this step

without difficulty. I added the $\frac{3}{32} \times 1\frac{1}{8}$ -inch trailing edge sheets and covered the bottom of the center section with a $\frac{3}{32} \times 3 \times 30$ -inch sheet. I put the wing aside and went on to the fuselage.

Care must be taken with the fuselage, as it's easy to get a warped one if you don't use extreme caution. I pinned the fuselage sides over the plans. Using Super T, also from Satellite City, I glued the $\frac{1}{8}$ -inch balsa doubler over the splice and put the $\frac{1}{16}$ -inch ply fin doubler in place. After both sides were complete, I marked all the locations of the formers, but before I installed the formers, I had to drill holes for the pushrods. After all the formers were prepared as per the plans, I assembled the fuselage over the top view of the plans, being very careful to keep it true. Next, using $\frac{3}{32} \times 2\frac{1}{4} \times 21$ -inch balsa, I sheeted the bottom of the fuselage from the step back to the tail and then the bottom from the step forward using $\frac{1}{8} \times 3\frac{1}{4} \times 30$ -inch sheet. Hot Stuff sped this construction phase along.

It was time for the pushrods which I fed through the fuselage using the flex cable from Hobby Lobby*.

For the tail assembly, I first glued P-1 in place on top of the fin and sheeted the top of the fuselage from F-5 forward to the nose, and added



Stealth, lean, and agile, the North Star at rest appears ready to pounce.

the nose block. Once I had the nose block shaped, it was time to go back to the wing. I trimmed the leading edges, per the instructions, leaving it $\frac{1}{16}$ -inch long, and fitted it to the fuselage. Satisfied of a good fit, I removed the wing and sheeted the leading edges and the top center section.

The next steps were tip floats, following the plans, and I built both to specification. Once the wing tips were complete, I glued the wing in position on the fuselage. Be very careful with this stage.

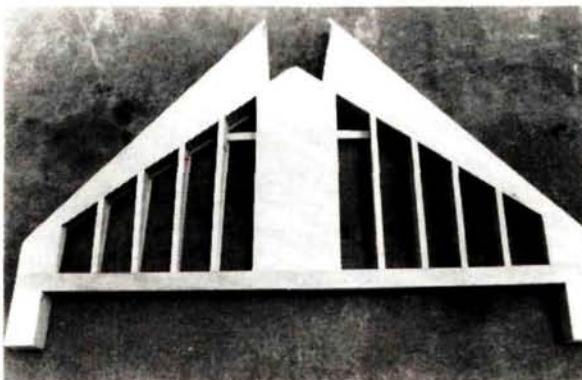
Next came the rudder, fin, and engine pod. Following the plans I assembled the lower fin and rudder with Hot Stuff. I assembled the engine pod as shown, and mounted it to the fin

with epoxy. This stage complete, I began assembly of the stabilizer and fin. All that is necessary is to sand and hinge the elevator. All of this was completed with no problems.

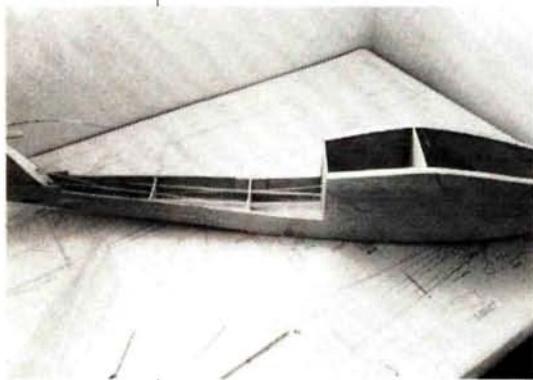
Once I had completed the upper fin and stab, I glued the stab in place on



Forward compartment houses radio gear which is readily accessible.



Above:
Assembled wing shows low parts count. Left:
Fuselage awaiting wing has control rods installed.



top of the engine pod, making sure that it was square, and added the fin. Then I glued the $\frac{1}{16} \times \frac{1}{2}$ -inch plywood strips on the inside of the fuselage for the canopy mount, then glued the canopy sides up from the three die-cut pieces of balsa wood, and pinned them in place. I then added the $\frac{1}{2}$ -inch triangle and top sheeting to the

fuselage sides and sanded to shape. The last point in construction is building the wing root extensions, and both of these were built to plan specifications.

I sanded the model to a nice smooth finish, and covered it with Balsa USA Solartex, which made covering easy.

Installation of the radio per the instructions brought no problems. Once I was satisfied with the operation of the controls, I removed the radio and O.S. 40 FSR engine, as it was time to paint the North Star. I elected to paint the model because of its amphibious capabilities. Using K&B* red paint, I completed the task with no problems. I used Top Flite's* MonoKote Trim Sheets for trim.

(Continued on page 96)

Engine Review Round-Up

by PETER CHINN



SAITO FA-80

SPECIFICATIONS

Type: Air-cooled, single-cylinder four-stroke-cycle with pushrod-operated overhead valves.

Bore: 27.0 mm (1.063 in.)

Stroke: 22.8 mm (0.8976 in.)

Displacement: 13.054cc (0.7966 cu in.)

Nominal Compression Ratio: 12.5:1

Speed Control: Saito two-needle type adjustable automatic mixture control carburetor.

Checked Weight: 533 grams (18.8 oz) including muffler.

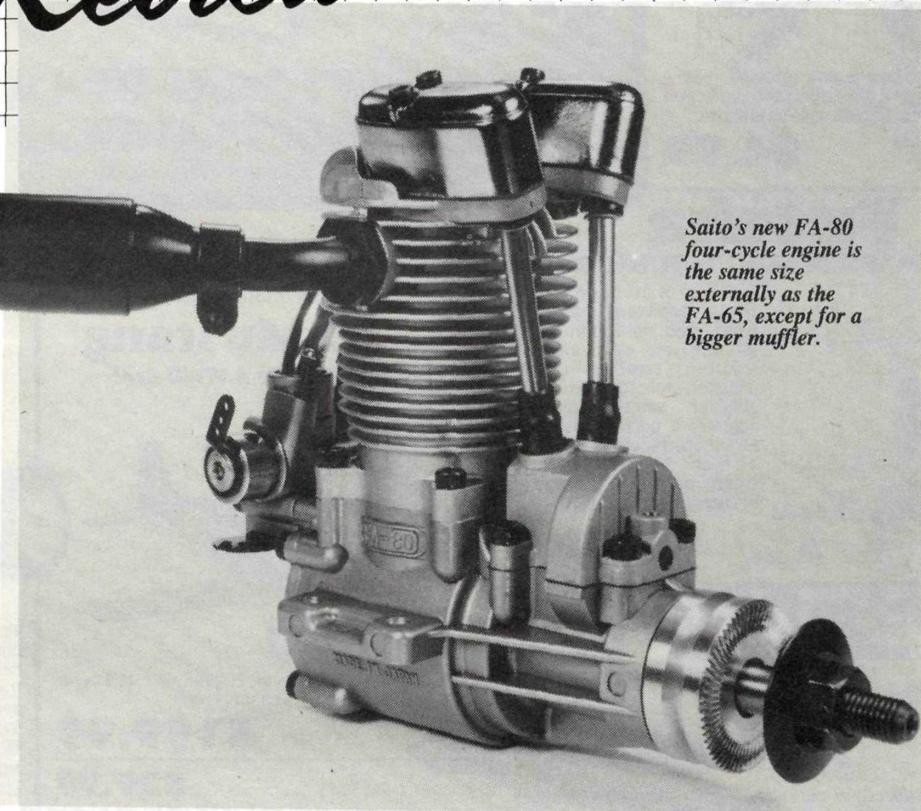
Mounting Dimensions:

Crankcase width: 40 mm

Length from prop drive face: 116 mm

Height above CL: 96 mm

Bolt-hole spacing: 50x21 mm



Saito's new FA-80 four-cycle engine is the same size externally as the FA-65, except for a bigger muffler.

Manufacturer's Claimed Power Output: 1.3 bhp at unspecified rpm.

Manufacturer: Saito Seisakusho Ltd., Ichikawa, Chiba Prefecture, Japan.

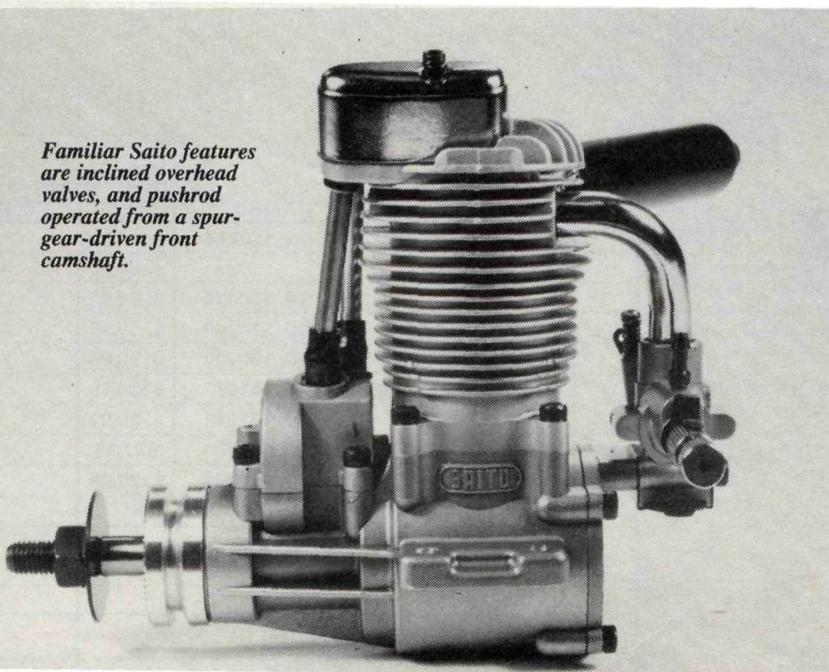
U.S. Distributor: United Model Distributors Inc., 301 Holbrook Drive, Wheeling, IL 60090.

EARLIER this year we reviewed the then-new 10.6cc Saito FA-65 engine which bridged the gap in the Saito single cylinder four-cycle engine range that had previously existed between the smaller sized (FA-30, FA-40 and FA-45) models and the big FA-120.

Now, Saito has added an extra intermediate model, the FA-80 dealt with here. Interestingly, this engine replaces an earlier .80 cu in. Saito four-stroke, the twin cylinder FA-80T. The 80T, Saito's first twin, had, in any case, become redundant since the introduction of the outwardly similar, but more powerful, FA-90T (see our full test report in the September 1984 issue of M.A.N.).

Another deletion from the range is the FA-30. For the record, the Saito four-cycle engine line-up now consists of nine models. The two smallest are the outwardly similar FA-40 Mk.3 and FA-45 Mk.2. Next up in size are the FA-65 and FA-80. The biggest of the single cylinder models, the FA-120, has now been joined by a special version, the FA-120S which is a lightened and slightly more compact

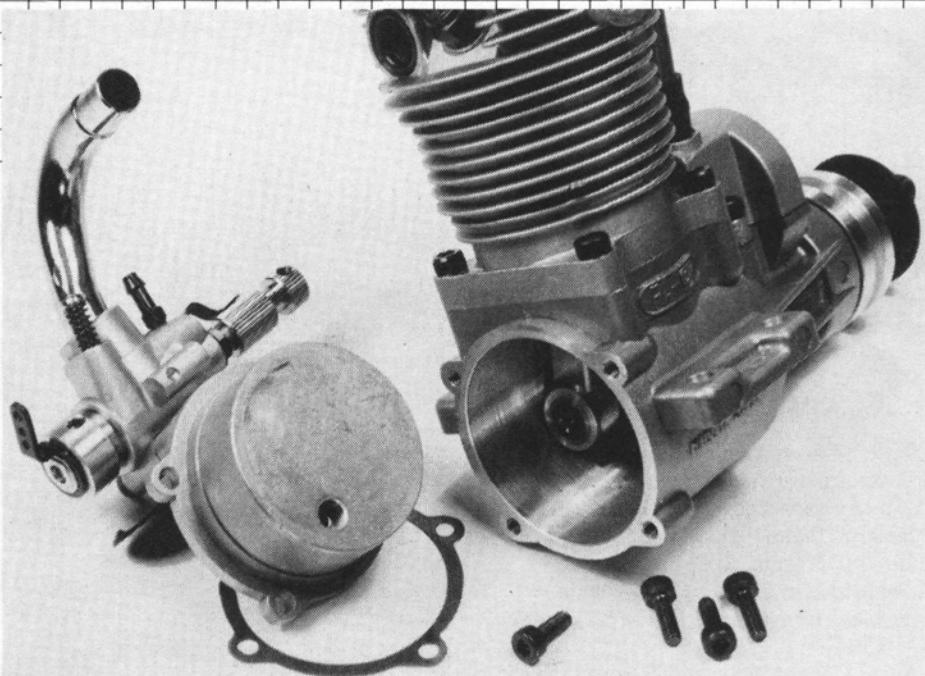
Familiar Saito features are inclined overhead valves, and pushrod operated from a spur-gear-driven front camshaft.



version of the standard FA-120, aimed at pattern fliers. The FA-90T Mk.2 is Saito's unique single-crank flat twin and the FA-270T Mk.2 is the latest improved version of Saito's big 45cc (2.75 cu in.) horizontally-opposed flat-twin dealt with in the August 1985 issue of *M.A.N.* Finally, Saito has announced production of its FA-325R5 five-cylinder radial engine. This is based on FA-65 cylinder assemblies, has the same bore and stroke as the FA-65 and totals 53.14cc or 3.24 cubic inches displacement.

To get back to the FA-80. Externally, this new model is almost identical to the FA-65. The 80's 22.8 percent increase in displacement, derived from a 2.2 mm enlargement of the cylinder bore and a 0.8 mm lengthening of the piston stroke, has been accommodated within the same body castings, so that the overall dimensions and appearance are virtually unchanged. The only outwardly identifying features are the FA-80's new carburetor, slightly fatter inlet pipe and larger muffler. It also has a slightly increased propshaft length to enable it to accept coarser pitched props.

It goes without saying that the FA-80



Like other recent Saito engines, FA-80 has detachable cylinder with integral head. Detachable backplate supports the new carburetor.

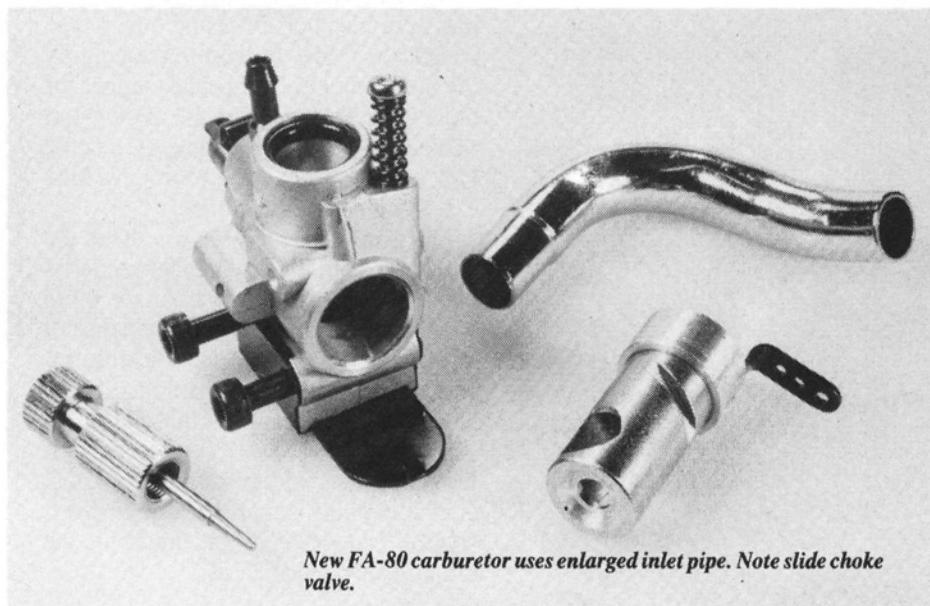
follows familiar Saito design practice. This means that it has inclined overhead valves, each operated by a rocker enclosed in a streamlined rocker box. Pushrods are also enclosed and are lifted by cams located above, and parallel to, the crankshaft, and spur-gear driven from it.

The crankshaft, supported in ball journal bearings, is contained in a housing that is part of the crankcase, but the cylinder block is a separate casting

secured to the case by means of a flange and four cap screws. In common with other recent Saito engines, the cylinder head is non-detachable: it is cast in unit with the cylinder block. The cylinder has a chromed brass liner which is used in conjunction with a high silicon content lo-ex alloy piston fitted with a single compression ring.

The carburetor fitted to the FA-65, as described in our earlier report, was a new type having fixed automatic fuel metering via a tapered spiral groove in the end of the throttle barrel. Fine-tuning of the idle mixture was via an airbleed screw. The FA-80, on the other hand, reverts to a TN (two-needle) adjustable automatic mixture control type. The airbleed screw is deleted and the throttle stop screw is relocated on top of the carb body instead of projecting rearward, as a result of which the effective overall length of the engine is slightly reduced.

Like the FA-65, the FA-80 has a curved chromium plated inlet pipe from carburetor to cylinder head but, as befits a larger displacement engine, the FA-80 pipe is formed from 8.5 mm o.d., rather than 8.0 mm o.d. tube. The exhaust pipe diameter is unchanged, but the expansion chamber muffler is considerably larger and has its outlet diameter increased from 6.6 mm to 7.1 mm.



New FA-80 carburetor uses enlarged inlet pipe. Note slide choke valve.

(Continued on page 104)

Engine Review Round-Up

by PETER CHINN

O.S. CZ-1

SPECIFICATIONS

Type: Air-cooled, single-cylinder side-exhaust two-stroke-cycle with crankshaft rotary-valve and Schnuerle scavenging.

Bore: 14.0 mm (0.5512 in.)

Stroke: 13.7 mm (0.5394 in.)

Displacement: 2.109cc (0.1287 cu in.)

Nominal Compression Ratio (full stroke): 9.5:1

Speed Control: Special O.S. barrel-throttle carburetor.

Checked Weight: 203 grams (7.2 oz)

Mounting Dimensions:

Crankcase width: 24 mm

Length from driver face: 80 mm

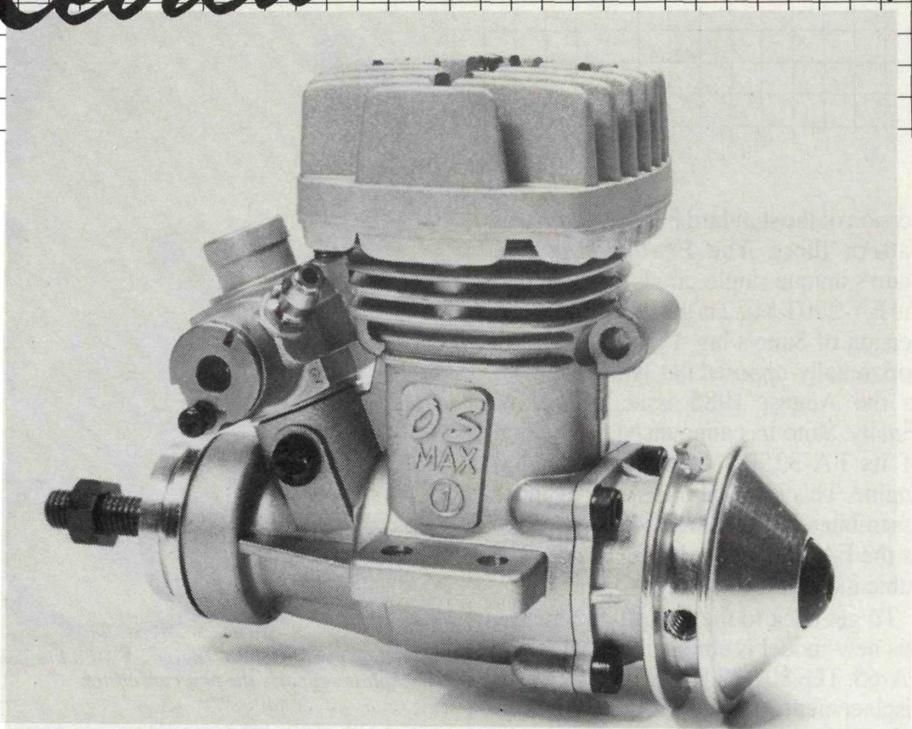
Height above CL: 54 mm

Bolt-hole spacing: 31.5x11 mm

Manufacturer's Claimed Power Output: Not stated

Manufacturer: O.S. Engines Mfg. Co., Ltd., Higashisumiyoshi-ku, Osaka 546, Japan.

U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, Champaign, IL 61820.



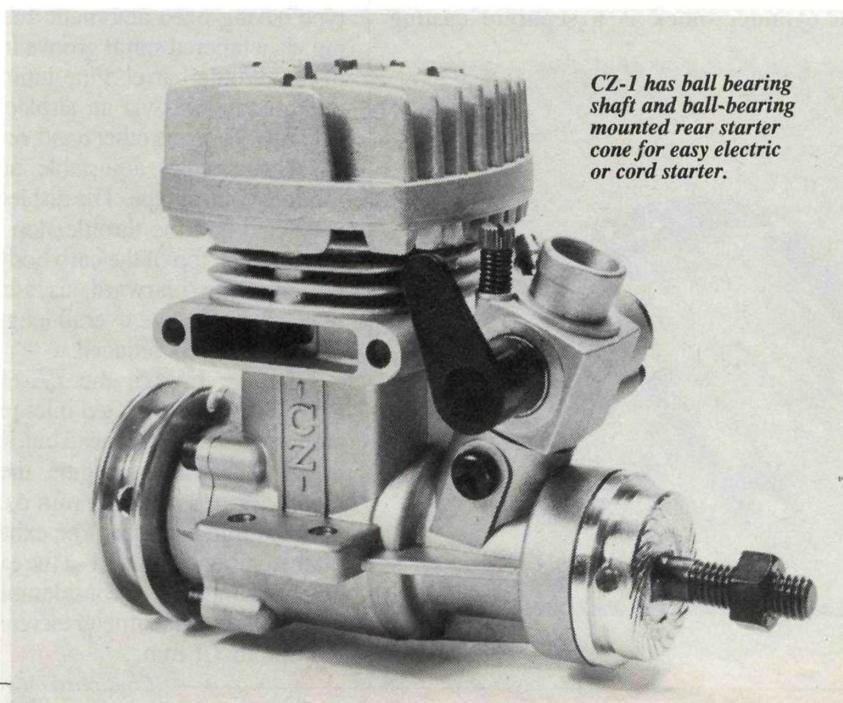
New small-sized O.S. car engine is standard equipment with Kyosho's Assault Buggy. It was specially designed for newcomers to model cars.

MODEL car engines of smaller displacement than the internationally recognized 3.5cc (0.21 cu in.) competition class are not new. One-twelfth scale radio-controlled cars fitted with internal-combustion engines, in place of electric motors, were

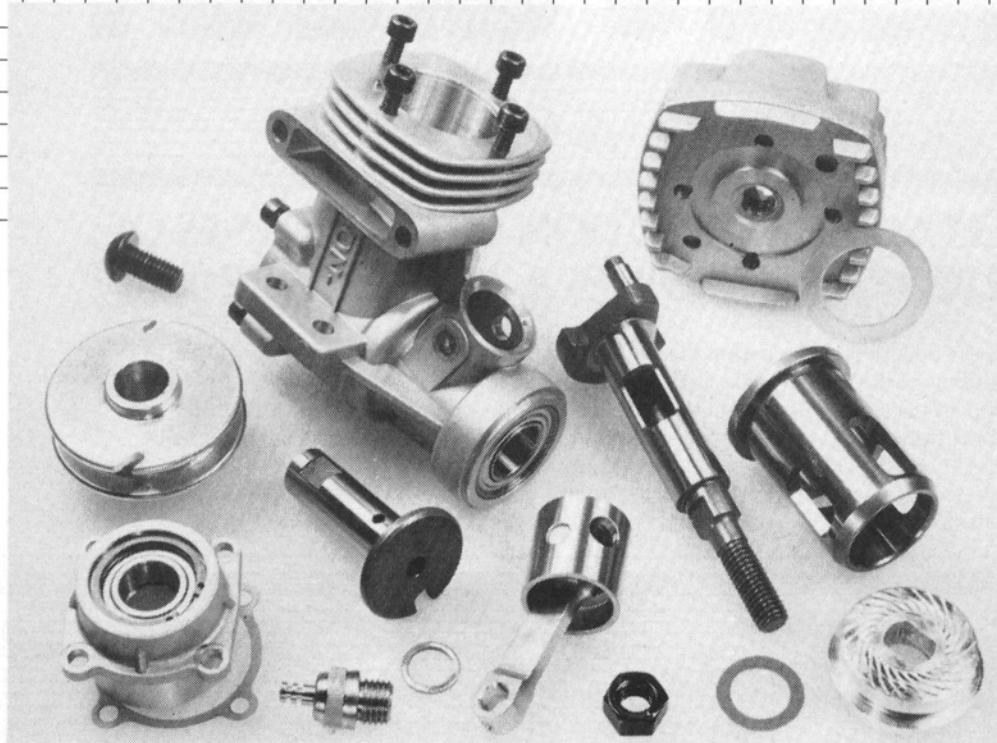
running in Japan back in 1977. In 1979 the Japanese established a class for these cars, limiting displacement to 1.8cc. This embraced engines such as the 1.75cc O.S. Max-10FSR (for which the factory then provided a heat-sink head) and resulted in the Enya company introducing a new model, the Enya 11CX, having a displacement of 1.79cc.

More recently, the great popularity of mass-produced off-road and buggy type vehicles has led to the commissioning, by the manufacturers, of special engines for these vehicles. It was for one of the latest of these, Kyosho's Assault buggy, that the O.S. company developed the new Max CZ-1 engine described here.

Of major concern was to provide the purchaser with an easy handling powerplant. This is most important for those who have had no previous experience of engine-driven models. Beginners' engines are usually of simple design, sometimes bordering on the crude. No such criticism can be levelled at the CZ-1. It is quite sophisticated for such a small engine. Nothing is skimped. The engine is sturdily proportioned and made to the usual O.S. high standards.



CZ-1 has ball bearing shaft and ball-bearing mounted rear starter cone for easy electric or cord starter.



Despite beginner label, new CZ-1 features Schnuerle scavenging, ABC piston/liner assembly and high quality construction throughout.

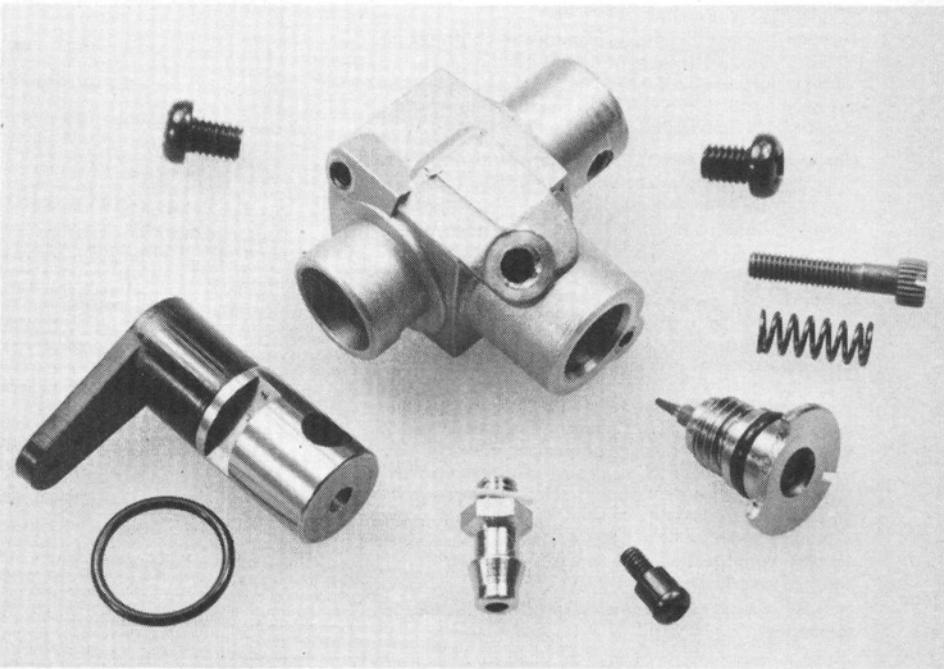
CZ-1's carburetor, developed specifically for beginners, eliminates needle-twiddling.

To simplify starting procedure, the CZ-1 is equipped with a rear starting shaft and this, like the crankshaft, is ball bearing mounted. On the rear shaft is mounted a starter cone to which a conventional electric model aircraft starter can be applied. Alternatively, the engine can be hand-started with a pull cord, the starter cone incorporating a pulley for this method.

There is a third means of starting when the engine is supplied as part of a Kyosho kit. This, included with the kit, but not with engines purchased separately, is the Kyosho "Zip" starter, a rack and pinion device that enables the crankshaft to be spun over vigorously with one hand, while the model is held with the other.

Carburetor controls, useful as they may be to the expert modeler, are frequently a source of confusion and trouble to the beginner. Therefore, O.S. has cut them to the bare minimum on the carburetor fitted to the CZ-1. There is a single set-screw to enable the engine's idling speed to be maintained when the throttle is closed, but the long familiar needle-valve, in the form that we usually recognize it, is missing.

Strictly speaking, the CZ-1 carburetor does incorporate a type of needle-valve. It is, after all, difficult to imagine a more practical solution than a needle-valve to



the problem of setting up a small carburetor to deliver, precisely, the minute amount of fuel (the ratio is about 1 part of methanol base fuel to 9 parts of air by weight) required to make a 2cc charge of combustible gas. But whereas, in a conventional model engine, the needle-valve will allow the user, deliberately or accidentally, to feed the engine with anything between a vastly excessive amount of fuel and nothing at all (neither of which will

enable it to run) the CZ-1's needle is factory set and the remaining adjustment available to the user is strictly limited.

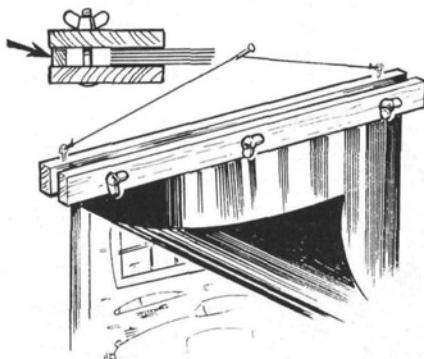
In place of the normal needle-valve control, the CZ-1 has a special large diameter mixture control screw installed in the left side of the carburetor body. This has an O-ring to maintain its setting in the carb body and an outer disc by which it can be moved, but only through

(Continued on page 121)

Hints & Kinks

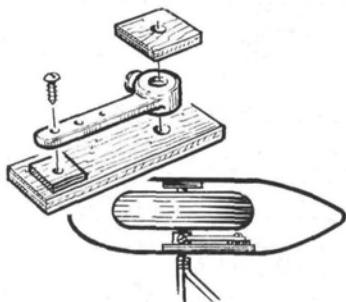
by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o **Model Airplane News**, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



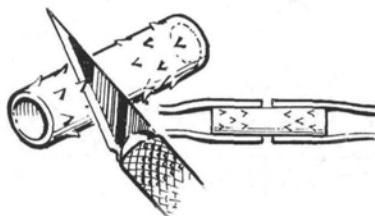
A practical solution to plans storage—they stay flat and are available for instant reference. Two flat wood strips and thumb nuts clamp the plans along the top margin, as the 1/2-inch square strip acts as the pivot for the clamping action. Your columnist suggests a cover of heavy black polyethylene. Without this, blue-line plans will fade to nothing in a couple of weeks.

Terry Crowell, Bridgeville, Pennsylvania



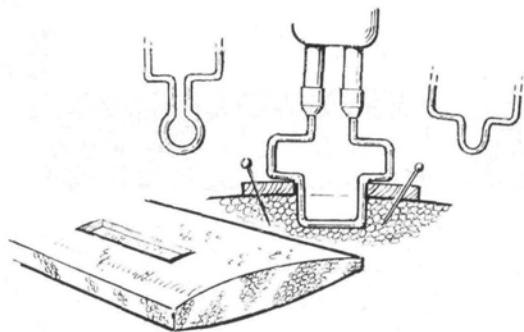
This contributor claims that his wheel pant mount is superior to the regular, rigid flanged versions. The single sheet-metal screw secures the nylon steering arm to the plywood scab. The ply pieces are glued inside the wheel pant while the setscrew clamps on to a small flat on the axle. If the model "stubs its toe," the steering arm flexes to save the pant. You could experiment with the flexibility by thinning the steering arm a bit.

Steven Brown, Campbellsburg, Indiana

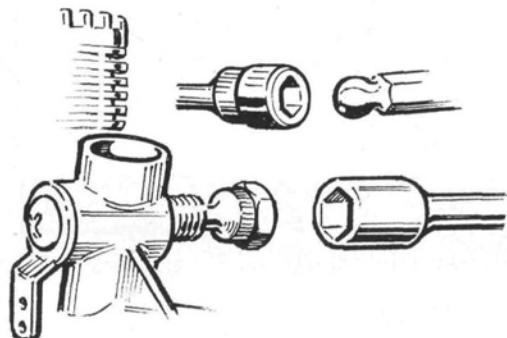


In using pieces of nyrod to join lengths of silicone fuel line, the contributor found a tendency for the line to slip off. His solution was to cut small barbs on the nyrod section. A point to note is how the barbs face each other on each half of the nyrod.

Warren Goldman, Johannesburg, Rep. of South Africa

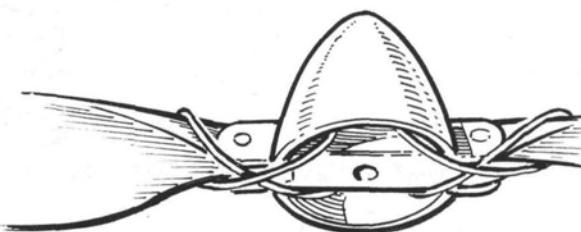


An old technique but worth repeating for newcomers: recesses and slots for landing gear blocks and pushrods are easily and cleanly cut in foam cores with a soldering gun and cutters which are bent from 3/32-inch diameter copper or brass wire. Wood strips pinned to the core act as guides and depth gauges. David Rincon, Bogota, Columbia



An engine safety tip: to keep fingers out of the propeller arc, solder a nut to the head of the needle valve, then use a nut driver to set the mixture. This prompts your columnist to offer the following untried idea. Solder the head of an Allen bolt to the needle, then use a ball-ended Allen wrench. The ball end allows the wrench to be swept back well clear of the prop.

Kevin Walsh, Hickory Hills, Illinois



For electric fliers with folding props: two light rubber bands, applied as shown, ensure that the blades will always fold and not leave one drooping in a high-drag position.

Heinz Mehldau, Gander Kesee, West Germany



Four-Cycle Forum

by ELOY MAREZ

THROUGH THE COURTESY of Jim Everette of Bethel, Connecticut, this month I'm able to tell you about a four-stroker that few of us have heard of. Jim sent along the following information about the beautiful German-made five-cylinder radial engine you see in the photos. It's known as the ST-540; but what that stands for I don't know.

I'm not sure who the manufacturer is, but I understand that quantities are limited. I'll have a contact in Deutschland for you, so read on.

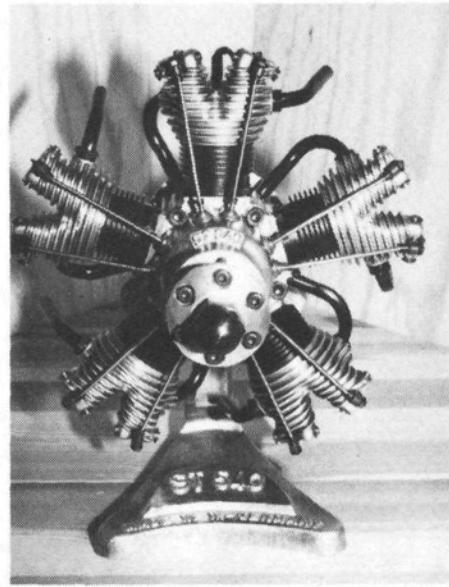
As shown, the ST-540 is a glow engine. The total displacement is 39.8 cubic centimeters, equivalent to 2.4288 cubic inches. The bore and stroke are 22.5 and 19.8 millimeters respectively, .8858 and .7795 inches. It's rated at 2.85 horsepower, at a weight of 1800 grams (3.97 pounds). The ST-540 is claimed to idle at 1,300 rpm, with a top speed of 6,800 rpm, on propellers from 20x6 to 22x8. One of its advantages is freedom from the problem of oil drainage into the lower cylinders—but more about that later.

Other interesting features of the ST-540 follow.

The heads aren't attached with externally visible screws, as is common practice with most other model engines. Instead, following full-scale practice, they use an internal thread between the head and the cylinder. The Kavan FK-50 is the only other model engine I know of that is made in this manner. The FK-50 uses a special thread, known as a "butress" thread, at this point.

The cylinders are anodized (black) externally and internally. There is no further internal cylinder liner; the pistons run on the anodized surface. The one-piece cylinder and cooling fins is claimed to, and should, provide better cooling—another feature it shares with the FK-50.

The valves are hardened and centerless ground, run in bronze guides and seat into bronze.

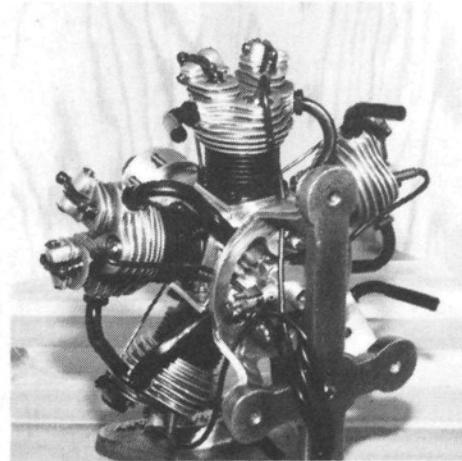


The ST-540, a five-cylinder four-stroke radial, turns a 22x8 prop at 6,800 rpm.

A Webra carburetor is used—obviously the designer sees no need to reinvent the wheel!

The intake and exhaust tubes are made of thin steel tubing, blued-in finish. Chrome plumbing is available as an option, at additional cost.

There are two main bearings for the crankshaft, and one for the cam. Both crankshaft and cam are heat-treated and ground, the latter polished for minimum



Rear view of the ST-540. Note the compact crankcase for this radial, which results in lighter weight and better cooling.

wear.

The rocker arms are custom-made for this engine.

All instructions are in German; however, the gentleman whose name follows has offered to translate the important parts. Apparently, there isn't much interest on the part of the maker of the ST-50 to export it, probably due to a limited manufacturing capacity. Anyway, I'm sure anyone lucky enough to get one of them will work out the instructions in some manner.

German-made Buco 18 glowplugs, comparable to the Enya No. 3, are furnished. It's not designated a four-cycle plug, but as a normal hot plug.

The engine is furnished in a special wooden shipping box, a good idea as something like this must be protected from post office football. (I guess the European equivalent would be post office soccer.)

How much? Well, about DM3450. That's in West German marks, against which the dollar hasn't been doing too well lately. In July '86 the exchange rate was 2.12 to the dollar, thus making the cost of the engine \$1,627.35. This is only a guide for you; the current exchange rate can be obtained from your bank. If you're

(Continued on page 107)



Syn-Lube is a new model engine lubrication. See text.

Small Steps

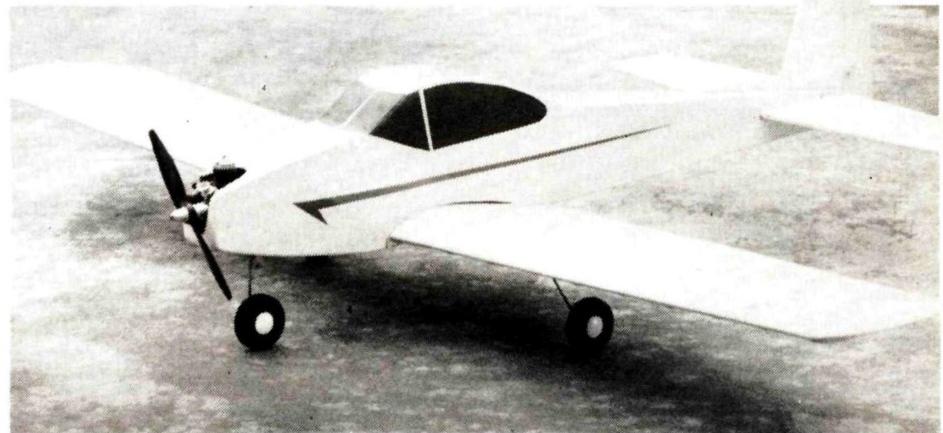
by RANDY RANDOLPH

All about small R/C aircraft.

When big airplanes with gasoline engines became popular, Model Airplane News instigated a column called "Giant Steps" to deal with this new trend in modeling. "Small Steps" could be considered the opposite of "Giant Steps"; however, it's still modeling in the fullest sense. Actually, thousands of modelers are building smaller airplanes for a number of reasons. First, is the need for an airplane to fit in one's car! Another is the lack of a warehouse-size workshop as is needed with some of the larger models. And certainly another main factor is the expense. These smaller airplanes can be a ball to build and fly, and they don't cost that much.

We hope you'll like this addition to your favorite magazine, and we seek your comments about it.

DBS



A neat design is this four-channel Neighvoin which uses an Ace radio throttle sleeve for the TD .049.



The excellent O.S. .15 powers this slab-sided three-channel bird. Properly designed rudder, elevator, and throttle-equipped airplanes can perform as if they had ailerons.

AGENTLEMAN by the name of Craig Hampson suggested, in a letter to the editor, that this magazine begin a column on small airplanes. Our editor, in his infinite wisdom, decided to oblige. In truth the vast majority of modelers fly one or more small airplanes, regardless of their main interest, because they're inexpensive, easy to build and maintain, and, above all, fun!

These pages will be shared by Mr. Joe Wagner, myself and, we hope, hundreds

of others, including *you*. But before an undertaking such as this can begin, it's essential that we first establish guidelines. In other words, what is *small*? Let's start with the upper limit and set it at an engine displacement of .25.

I know that there are some very strong .25s out there that are on a norm with the sport .40s as far as power is concerned, but there are also a lot of .25s around that are ideal sport engines. Let's stay with .25 as the top limit.

On the bottom end of the scale are the .01s, .02s and .049s. The .01s-.02s are a little impractical, but the .049 is an engine that's captured the attention of modelers. There have been more of them manufactured than any other type or size of model engine; in fact, all the others combined aren't even a close second! They power racers, fly scale, pattern, and all kinds of sport planes from powered gliders to fun-fly machines. They not only fly in all these events, but win! So, .049 is where small begins.

For our purposes size of airplane shouldn't count. Some of the most fun I've had with R/C came from flying a .15-powered, 6-foot airplane that looked like a rubber-powered baby ROG and was called a Dragon Fly. Our club staged a number of combat contests with this type of airplane. Power was limited to .15s with a minimum wing area of 550 square inches and a maximum weight of 2½ pounds. They towed 40-foot crepe paper streamers and every now and then one got cut, but not often! There were several slow-motion mid-air flights with little or no damage. Big, low-powered airplanes are fun.

Our parameters, then, are set: engine size is .049 to .25 cubic inches, and there's no limit on plane size. There's one more

thing we should add, *simplicity*. If a small, sport airplane isn't easy to build, then we won't include it in this column. We're going to be interested in the fun of flying and the ease of transport rather than complex construction. If it can be done an easier way, then it will be.

About ease of transport, the smaller size of new cars is about the best reason I can think of for building small airplanes. I've been to the field many times when I'd take my .20 four-stroke out of the trunk, make two or three 10- to 15-minute flights, put it back in the trunk and leave the field for home while some poor soul

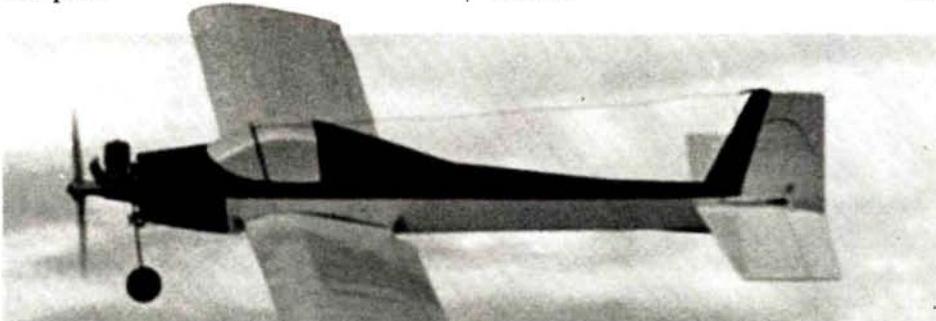
was still putting his Q-scaler together!

As a practical matter, a lot of the airplanes we talk about and build will be in the .15 to .20 range. Most of us fly from grass fields and this size engine has the power to make good takeoffs and landings from these fields. Wingspans more than likely will range from 40 to 60 inches and the airplanes will weigh from less than two, to about three pounds complete.

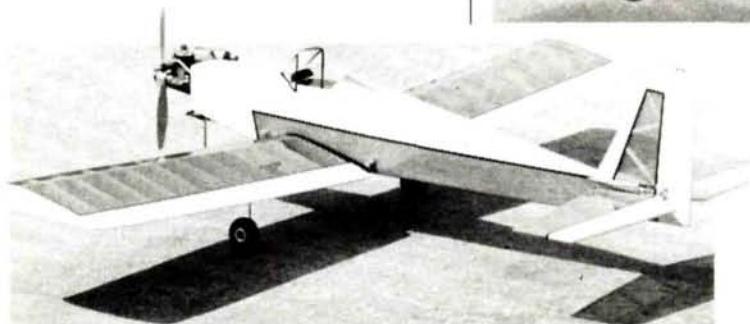
The most important part of this column will be *you*. What you want to build and fly is what we'll talk about. Everyone wants to hear about your experiences—so come on, don't be bashful.

And when you do write, why not help us name this new department of your favorite magazine?

Randy Randolph c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■



Below: Not to be left out, a .10-powered bird. Simple square airplane with cosmetic additions that add lots of charisma.



Above: M.A.N.'s own Titewad, one of the best .20-.25-powered sport airplanes, has slab sides but can be made to look good with just a little care and proper trimming.

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TAIL-WHEEL STEERING

by DAN SANTICH

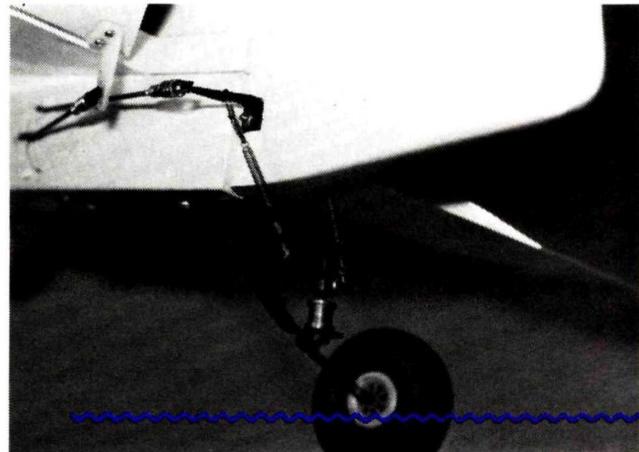
ONE OF the most overlooked parts of any airplane is the tail wheel. That's probably because it doesn't affect the flight performance, is relatively maintenance-free, and usually lasts longer than any other part of your model. In fact, it could qualify as being insignificant altogether in some modeler's eyes. Of course, these are the modelers who have a takeoff roll that looks like an Alpine skier attempting a slalom blindfolded.

Tail wheels and skids serve two purposes. First, they protect the tail end of your airplane from Mother Earth. Second, they give the airplane direction while it's moving on the ground, although a skid is usually ineffective on pavement or concrete. In fact, some of the most beautiful ground loops you've ever seen were probably done by planes trying a takeoff with only a tail skid. The tail wheel was invented because of this problem. Who actually used the first tail wheel on an airplane is unknown, but he (or she) should be given a tip of the hat by all. They have saved our tails! If any of you readers know who this person is, let me know so I can send them my thanks. I love tail-draggers.

At the start of this article I said that tail wheels do not affect the flight performance of an airplane. Actually, that's not altogether true, as they add aerodynamic drag and weight. But for all practical purposes, these elements are insignificant (unless you're building a microfilm indoor R/C model).

Generally speaking, if you fly off of grass all the time (lucky you!), you only need a tail skid. Certainly if it is a scale model, you'll use the type prescribed, or for that matter what a kit prescribes. A tail skid can be made from metal, plastic, wood, or plynaphanic composite. If you want it to steer your plane, it should be attached to the rudder for the most effect, but this makes life difficult for the underside of the rudder as well as the servo driving it. Normally the skid is attached to the lower fuselage section near the rudder and is permanently fixed, but it can be indirectly connected to the rudder for steering purposes. By indirect, I mean that the landing shock is absorbed by the skid and not the rudder.

Full-scale tail wheel steering is similar to that of modeling. Note tiller arm, shock springs, and force arrangement.



Tail wheel setups on models emulate full-scale practice in theory and application. The C.B. unit is strong and functional.

If you fly off of a hard surface and you fly anything short of an Atlas missile, you'll want to use a tail wheel. It gives you positive directional control on the ground and adds a bit of sophistication to your takeoff maneuver. When you land, it lets you taxi back to the pits just like a pro. Let's face it, anyone can steer an airplane with a nose wheel. It takes a *real pilot* to do it with the tail dragging the ground.

Setting up a tail wheel is much the same as with a skid or wire indirectly attached to the rudder. Remember that a wheel has much more effect than a skid on pavement.

Installation of the tail wheel steering on a model is not as simple as it seems. Things to consider are turning radius, centering, attachment, rigging, and control load. The movement of the tail wheel places an additional load on your rudder servo, so make sure it operates freely. Connecting the actuating linkage for the tail wheel steering can be from the rudder pushrod or a separate pushrod altogether. Naturally, if the tail wheel is attached directly to the rudder, no additional linkage is required.

On larger models, such as quarter-scale or giants, most modelers prefer to use the C.B. Associates* assemblies. These units are scale-like in that they use leaf springs to absorb the shock of landing and they incorporate the use of a tiller arm for directional control that is connected to the rudder arm by springs. The springs, which are on either side of the tiller arm, take up the shock in case of a crosswind landing. C.B. also makes scale tail wheel assemblies for .60 and smaller size models and they certainly add a degree of realism to something like an Aeromaster or any number of other sport models.

Generally speaking, a tail-drafter will have a larger turning radius than a model with nose-wheel steering simply because the distance from the main gear to the tail is longer, thus giving you a bigger arc. This desensitizing effect can make your ground-handling very nice. You must remember, however, that on takeoff your stab is the last thing to start flying. Because of this, a little rudder action is necessary to keep the airplane straight until it does. This is where the pilot in you comes out. If you can keep a tail-drafter as straight as an arrow on takeoff, baby, you've got what it takes!



The degree of arc of the tail wheel is usually more than the degree of travel of the rudder.

If you use a piece of piano wire for the strut, the length of it and the angle of rearward deflection will give you a wide range of ground-handling capabilities. Normally the trail-back distance from the rudder hinge line should be approximately half the width of the rudder. The amount of travel should correspond with that of the rudder. Never have more steering deflection than rudder travel. Also, make sure that the tail wheel does not wobble on its axle.

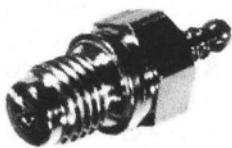
When setting up an airplane with a tail wheel, the main landing gear, aside from being aligned with the fuselage, should have a slight amount of toe-in, meaning that the forward portion of the wheels should be angled in toward the horizontal centerline of the airframe. This is much the same as that on an automobile in that it helps you track straight.

Tail-draggers are fun, and the more you familiarize yourself with them and their characteristics, the better you'll like them.

**The following is the address of the company mentioned in this article:*

C.B. Associates, 21658 Cloud Way, Hayward, CA 94545. ■

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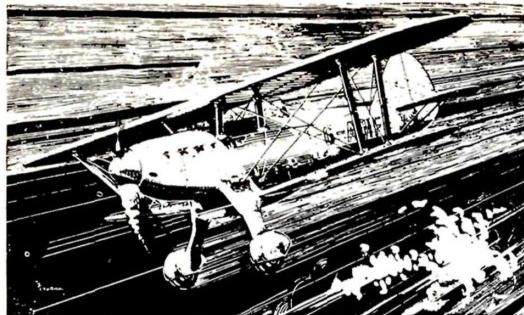
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Golden Age of

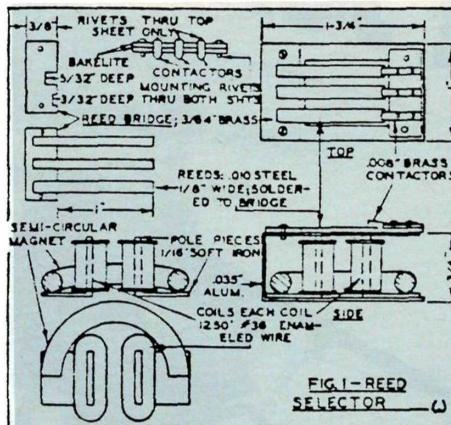
by HAL "PAPPY" deBOLT

FINALLY we're into multichannel R/C, the cornerstone of today's style of R/Cing. Modern racers should find this of interest as it relates directly to what they now use. There were two prerequisites before anything could be done about the radio. We previously described the servos that would require two separate information channels for each servo. With several servos required, we also needed some sort of reliable, lightweight discriminator in the receiver to route the transmitted information to specific servos. Remember, this was *before* the transistor and the clever I/Cs that perform the task so simply today!

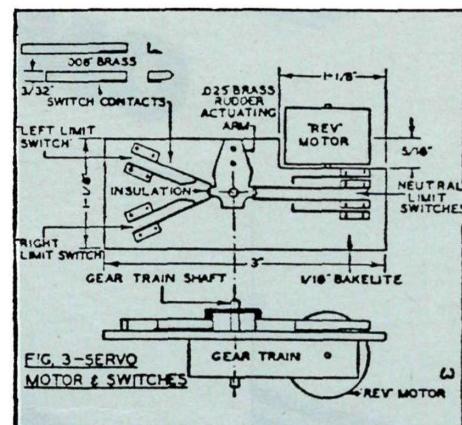
If a small, thin piece of steel is placed in an electromagnetic field and the flux of that field is varied in frequency, a frequency will be found where the steel will vibrate vigorously; such a steel blade is labeled a "reed." Conversely, if the frequency is fixed, the size of the steel blade can be varied until it vibrates at the established frequency. For electronic-switching purposes such a reed is usually about $\frac{1}{8}$ inch wide, .010 inch thick with the length tailored to match the desired frequency.

"Reed relays" had been used in industry for some time. These devices consisted of a thin steel blade mounted in proximity to the core of a magnetic coil. The opposite side of the blade, further out from the coil core, was an electrical contact at a specific distance from the blade. Mechanically simple and lightweight, this "switch" was operated by passing current through the coil at an established frequency. Like a musical string, the steel reed blade was tuned to vibrate at that frequency, thereby making electrical contact. The contact was insulated from the reed, resulting in an effective switch.

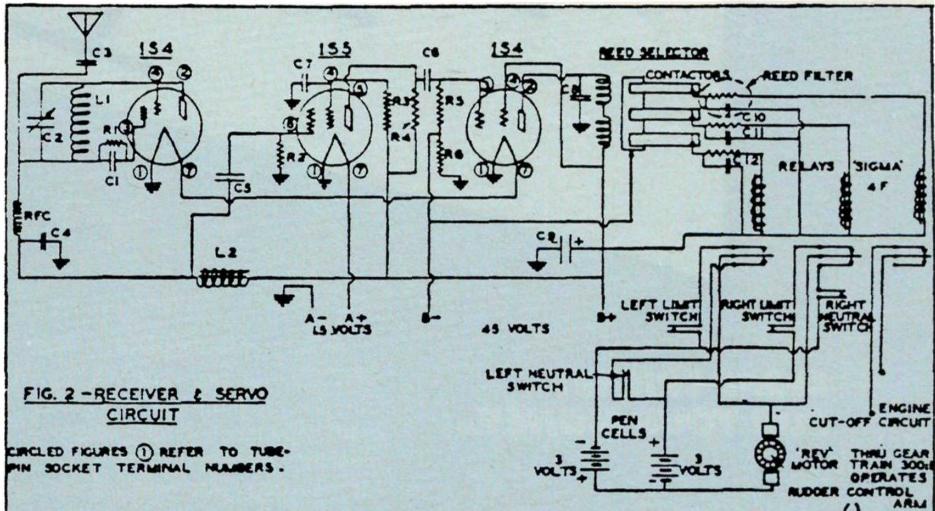
These reed relays were used mostly in a "closed circuit" environment allowing control of numerous devices from a single operations center. The reed relay would control each device as each would only respond to a particular frequency. With the command-post coder you could select a device and actuate it by sending the current at the associated frequency over



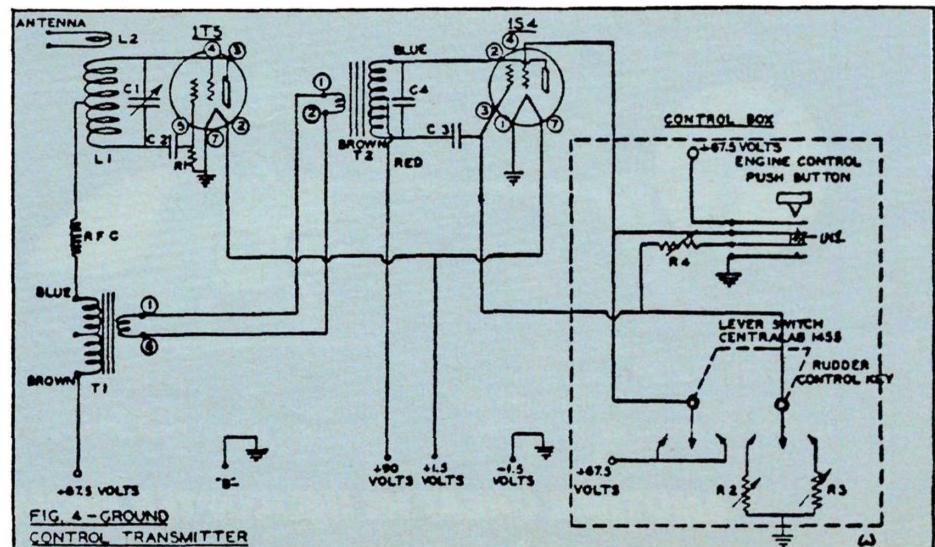
Three-channel reed selector, notches in bridge produce different reed lengths.



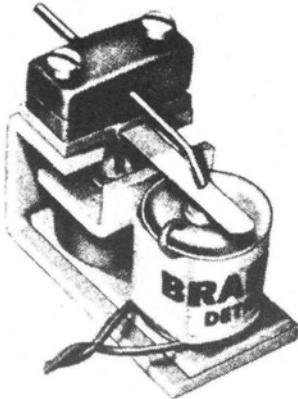
This servo unit has both neutral limit and left/right limit switches.



Complete receiver schematic. A and B batteries for the receiver are not shown here.



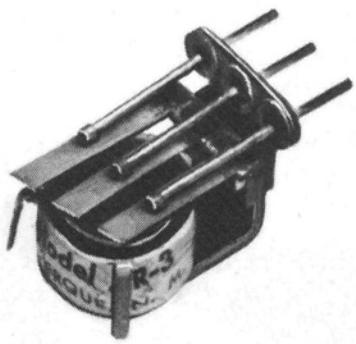
The transmitter circuitry of an early rig.



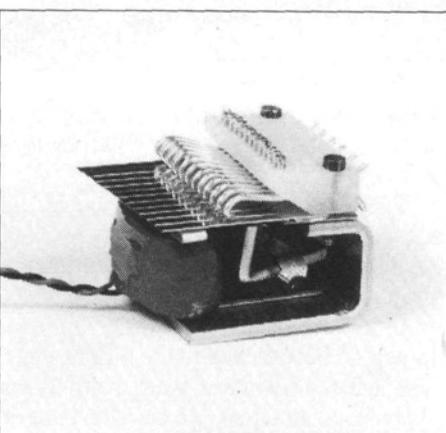
Typical reed relay is still produced by the Bramco Corporation.



A day at the flying field, 1941-style. Many Rudder Bug variations here. Note home-built Rockwood transmitter on tripod.



Early three-channel reed bank used insulated rods for contacts.



A later-day 12-channel audio tone reed bank. The row of screws allowed precise contact adjustment.

wiring. The value of the reed relay was its mechanical simplicity and its ability to discriminate between the various frequencies closely and reliably.

The reed relays were the inspiration that led to our multichannel reed systems with their inherent ability to be made lightweight. No other tone filter system could compare for R/C use. R/Cers would simply have to develop them into multichannel devices capable of radio operation with lightweight battery power. History records that the development led to the "R/C reed bank" and the great success we had with it. Once the way was paved, many R/Cers worked with reed banks resulting in different versions. Naturally there were both pioneers and followers, some with simple copies and others with distinct improvements. However, the basic concept never changed.

The arrangement was an electromagnetic coil with a *long, narrow* iron core. Adjacent to one end of this core several steel reeds were mounted, each a different length and tuned to separate audio frequencies. Opposite the core, near the end of the reeds, individual, insulated electrical contacts were provided and adjusted so

the reeds could vibrate against them. With most designs the steel reeds were common to one polarity. The contacts were routed through a relay's coil to the opposite polarity. Thus, a five-channel system would have five reeds and five associated relays. You could say, two "switches" in series for each channel. The reason was that the vibrating reed couldn't pass enough current to a servo motor; it took a solid relay contact to do the job. Popular reed banks ranged from three to 10 channels (reeds), a few with as many as 12. So the maximum number of "control channels," in today's lingo, was six.

We're all deeply indebted to Jack Albrecht of Oceanside, California; Alex Schneider of Clearlake, California; and *Model Airplane News* for the details that allow us to describe the recognized birth of the R/C "resonant reed system."

Edward L. Rockwood of Walnut Creek, California, is a posthumous member of the prestigious AMA Hall of Fame, an honor bestowed on him for his pioneer work in developing the R/C multichannel reed system, the system which, as we've said, opened the door to today's R/C flying. In the late 40s, radio itself had

frontiers to conquer. Thus, radio was an inspiring place for the technically minded. This encouraged many innovators to bury themselves in the science. Ed Rockwood was one who turned to this expanding research in radio control development.

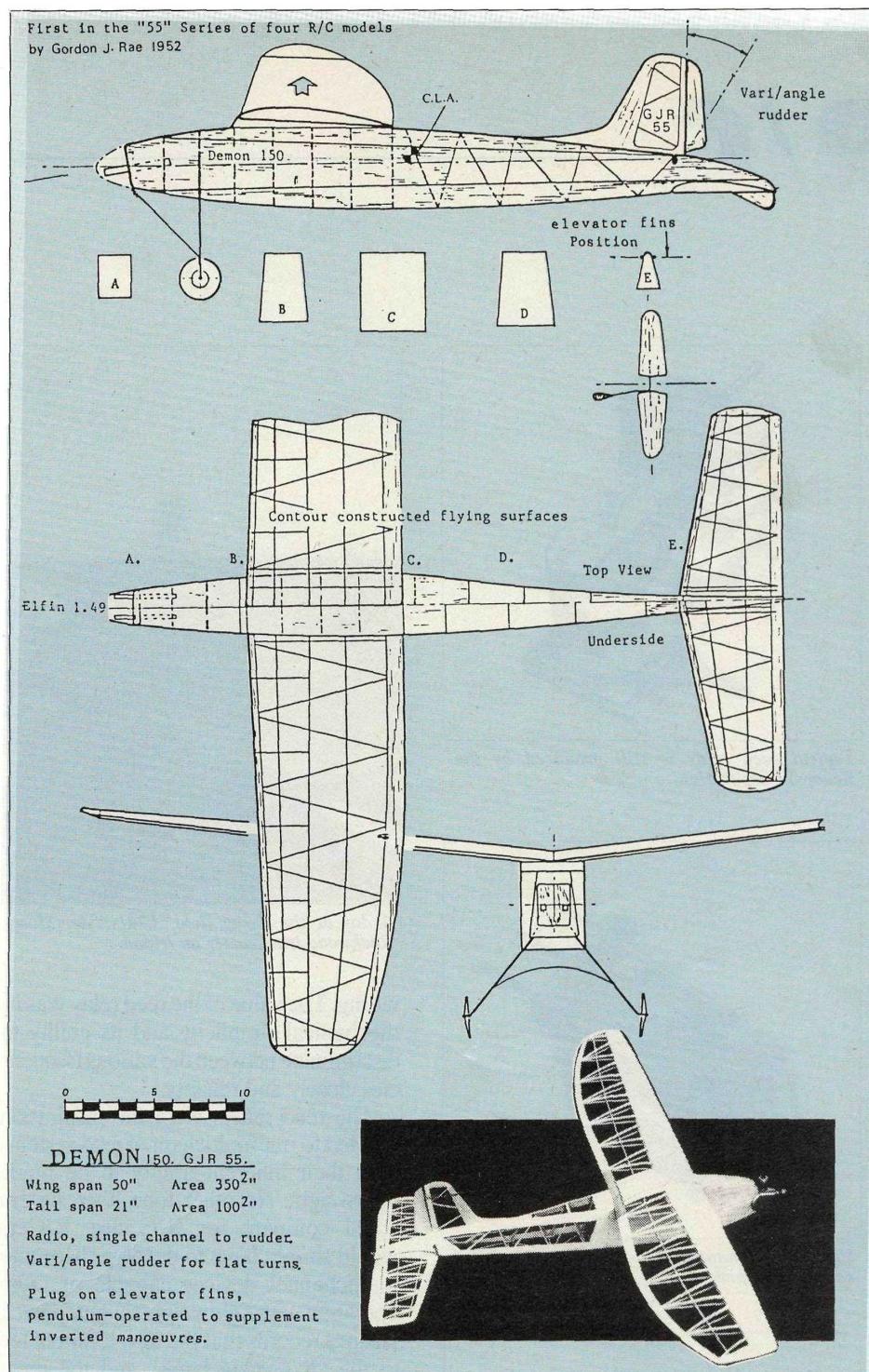
Most early R/C radio designs were elementary, chosen for their simplicity and adaptability. Mr. Rockwood studied the needs of R/C closely and realized that along with the need for a multichannel, there should also be an extensive improvement in circuitry. In the late 40s Rockwood designed and developed what he believed would become the standard R/C system. Fortunately for R/C, he presented the details in the August 1949 *Model Airplane News*. This one article probably established the guidelines used for all reed system development.

At any point in time, many modelers are innovators. They're noted for producing intricate devices from common modeling materials. In studying the Rockwood conception, it's noteworthy that the materials needed could be found in any hobby shop or Radio Shack of that period!

Mr. Rockwood wasn't a manufacturer or businessman, hence his innovation followed a different path from one that a factory would use. The San Francisco Mustangs Model Club was prominent in Rockwood's area at the time and had recently switched from C/L to R/C. When the Mustangs learned of the new concept, it sounded great to them. Ed was a congenial person and gladly built some systems for a few Mustangs members in exchange for some work he needed done.

Once this was done, it was relatively easy for other club members to copy the design on their own. Soon the majority of the Mustang club was flying multichannel while the rest of the country was still using single-channel variations! This probably also helped the reed systems progress because as a group much more experimenting could be done. The most popular model used by the Mustangs was a Elbert Weathers "Pacific Coaster" (converted from F.F.), a sleek pretty cabin-style that flew much faster than the other R/C designs of the day. Power was usually from an Anderson Spitfire .60. Thus, the Mustangs pointed the way with model design as well.

Happily, as you can see, we have the drawings and schematics from Rockwood's *Model Airplane News* presentation. These neatly show the system's make-up. Control was by a hand-held "switch box" connected to the transmitter by a cable. The heavy batteries were in a



Gordon Ray's Demon was an early R/C attempt.

ground-based box that had a 6-foot pole on top. The transmitter was attached to the end of the pole with "ground plane" rods extending from it. The antenna was a vertical rod about 6.5 feet long. Apparently everything was done to get the maximum output from the 1 watt available!

Rockwood reasoned that a super regenerative receiver was best for R/C because of its superior sensitivity and interference rejection. He told of listening to East Coast broadcasts in his California home! His receiver was a state-of-the-art audio-style adapted to drive the desired reed

bank. Choice of circuit and components kept the total weight with batteries to a minimum.

There's a modeler's influence in the servos, which were developed by making do with what was available. Note that the motor and gear train was extracted intact from a *toy vehicle* with only an arm having to be attached to the output shaft. The needed switches were from brass shim-stock attached to a bakelite base or even plywood by some modelers.

What was important to the future of R/C was that the concept was so funda-

(Continued on page 122)

Field & Bench Review

R · P · M

TRYSTAR

The ultimate trainer—
already built and extremely docile.



by ART SCHROEDER



WHEN a stranger to the wonderful

world of R/C thinks of trying the sport, he will tend to look at airplane kits that are easy to assemble from finished parts. It is, after all, the type of kit with which he is likely to have the greatest success. He must also look for an airplane which will be easy to fly as he begins the transition from something to build to something to fly.

Just such an airplane is found in RPM's Trystar from Varicom Industries*. It's a radio-control airplane for training

that my tests showed to be a nearly ideal entry for beginning fliers. Trystar is designed for .15 two-cycle or .20 four-cycle engines. However, it is a simple matter to convert the mounting for engines up to .25. That was my choice since I prefer slightly more power as a safety factor; I used an O.S. .25 R/C, a relatively low-cost sport engine. The airplane cruises at half throttle and, at full, gets out of our rough field very quickly.

Type: Sport
Wingspan: 48 inches
Wing Area: 380 square inches

Engines: .15-.25
Channels: 3 or 4

THE KIT. This kit is complete with all surfaces hinged. For the record, Trystar spans 48 inches and has 380 square inches of wing area. My test airplane weighed exactly 3 pounds all-up, for a wing loading of 18 ounces per square foot.

Trystar features an ARF style of construction called, simply, "EZ" (for obvious reasons). In effect this is a built-up main frame covered by a skin of plastic foam with a synthetic paper layer that has all colors and a clear mylar protective surface. I have built a dozen EZ-style models and all have shown exceptional durability. That ARF style is surely the answer to ready-built aircraft for the '80s—perhaps the '90s.

CONSTRUCTION. There are only 12 basic parts to Trystar and all of them are finished and decorated. They only need be assembled on a simple 7-step procedure. Wing halves are joined with epoxy glue (I used 5-minute, although 30-minute glue is included in the kit) through a plywood stub spar. To clean things up and further strengthen the center section, two plastic covers are installed with thin cyanoacrylate glue; I used Satellite City's* Hot Stuff. The cyanoacrylate is wicked in around the cover's edges and only a bit is needed. Hot Stuff wicks underneath the joining parts and when set provides a wing with strength more as a

"bridge." So often, builders assume that, "if a little is good, a lot is great." In the case of Hot Stuff, that's not true. Use a flow only sufficient to secure edges; the glue will travel to do the rest of the job.

That's it for Trystar's wing. The fuselage is just as simple. Epoxy is used to glue the fin in place as it is to secure the stabilizer where two self-tapping screws add some additional hold. Don't depend on the two screws alone to hold the stabilizer—the epoxy glue is needed!

The landing gear setup is simplicity itself and should not pose a problem for anyone. A tank requires assembly and the engine is mounted. By the way, all hardware, wheels, and fittings are included; with Trystar you only provide the engine and radio. You may need to open the engine mounts a bit with a hobby knife to fit different engines in place on the built-in plywood mount. Just be sure you allow sufficient clearance as indicated from the back of the included spinner to the firewall.

There is probably more work to fitting Trystar's cowl than any other task. If you use a .15, there is no problem, but any small four-cycle or larger glow engines will require opening the cowl's clearance hole. I found a Dremel cutter best for this, but an X-Acto knife will get the job done.

(Continued on page 96)

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Field & Bench Review



A winner for Sport Scale

Robbe R · O · B · I · N

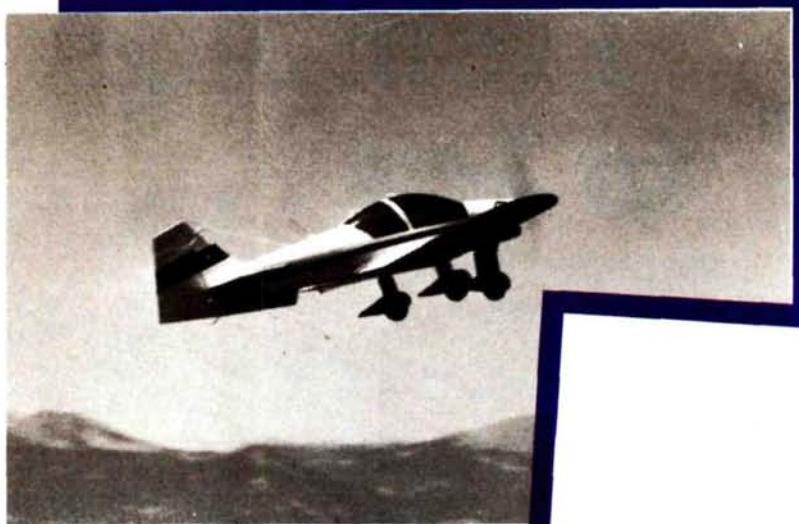
by JACK AYCOCK

TRY THIS ON for size—a German R/C kit of a French-Canadian airplane, a Japanese radio and engine, built by an American. A melting pot of modeling!

Robbe* sure picked an excellent subject for making a kit. The French-Canadian “touring,” two-place airplane is excellent as trainer or sport aerobatic plane, and the model flies as well as the full-size machine. Robbe has managed to capture all of the details in this kit: it can hold its own in any sport-scale competition. All outlines and dimensions are very close to exact scale, even the cockpit, which includes the instrument panel.

THE KIT. My first impression: What a box! It is huge as it has to be to hold the fuselage and wings. The fuselage is beautifully molded of an ABS type plastic that has the strength of epoxy. Be sure to use only Robbe epoxy for the construction—their two-part epoxy was used for the entire plane. It seems that our C.A. cements and epoxies just won't adhere to the plastic, regardless of the brand.

CONSTRUCTION. I followed the excellent assembly booklet step by step during the construction of the kit. It is well-done and leaves nothing to chance. Just check off the items as they are completed. There's nothing difficult in the construction. A complete hardware package is included in the kit. The only items needed to complete the model are engine, spinner and radio. There are even tiny wood screws to



Type: Sport scale
Wingspan: 1700 mm (66.9 inches)
Wing Area: 53 dm² (720 inches)
Fuselage Length: 1443 mm (57 inches)
Powerplant: 10-20cc four-stroke

be used for additional detail around fairings and the canopy. The wings come pre-covered with balsa and only require joining and hinging. They do require a servo in each wing panel for the ailerons, and due to the length of the servo leads Futaba* chokes were installed in each wing panel along with a Y connector. Hobby Poxy* Fast Fill was used over the balsa after the wings were joined and the ailerons hinged. Two coats were brushed on and sanded after each coat. The landing gear and wheel pants were added to complete the wing.

The fuselage was next on the agenda and this required minimal work. Cut and trim some of the plastic in different areas, add some bulkheads and the fuselage is about done. The instruction sheets—there are no full-size plans as they aren't required—show the throttle servo up forward of the firewall. I put my servo back in the fuselage and used the servo mount as a "weight holder" because I needed 4 ounces to get the CG within limits. And this also made the Enya* 120R throttle hook-up easier. The powerplant went in without a hitch. An Enya 120R four-cycle that was provided impressed me with performance and beauty. I ran

the engine on a test stand for 45 minutes using a 15-6 Zinger* prop and K & B* 100+ glow fuel. The engine started on about the third flip without the electric starter. I found myself looking for compression, though, on each flip, like a two-cycle, then once over this it was a snap. This engine has POWER and runs smoothly. Top end after 45 minutes of break-in was 9,800 rpm and at idle 2,200 rpm. Throttle response and mid-range were outstanding.

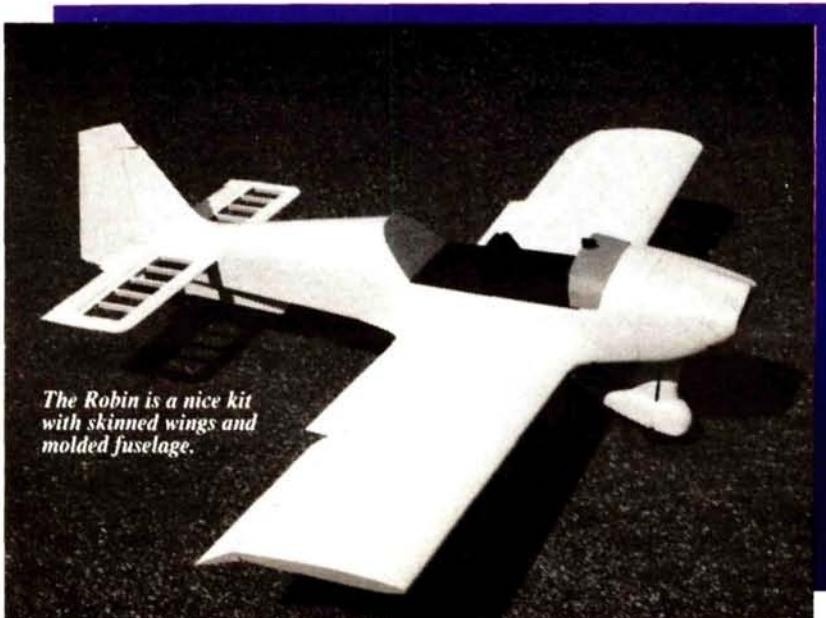
The cowl was fitted next with the engine bolted in place. Cut-outs were made to clear the cylinder head, muffler and needle valve. The big Enya 120R fit like a glove. The nose gear was installed and wheel pant added.

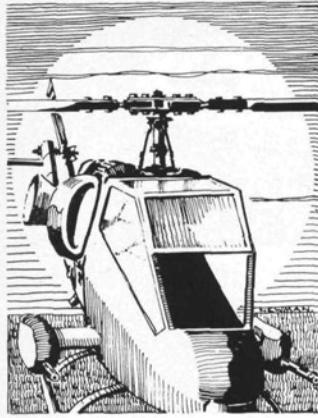
As the tail feathers are pre-built, all they require is sanding, covering and hinging. Glue them in place on the fuselage and the airplane is about done. I used Royal* Silron and nitrate dope for the horizontal stab covering. Glue some fairings in place here and there, add the cockpit and canopy and the bird is ready for the radio and paint.

A Futaba Conquest 6NLK AM radio was selected to guide the airplane on the land and in the air. This is a new offering from Futaba and features newly designed sticks that are exceptionally smooth, positive, and adjustable in length. It also has servo-reversing and aileron/elevator dual-rate switches. Servos were the small rugged S28 type. I can remember when a radio of this sort would have been considered top of the

(Continued on page 103)

The Robin is a nice kit with skinned wings and molded fuselage.





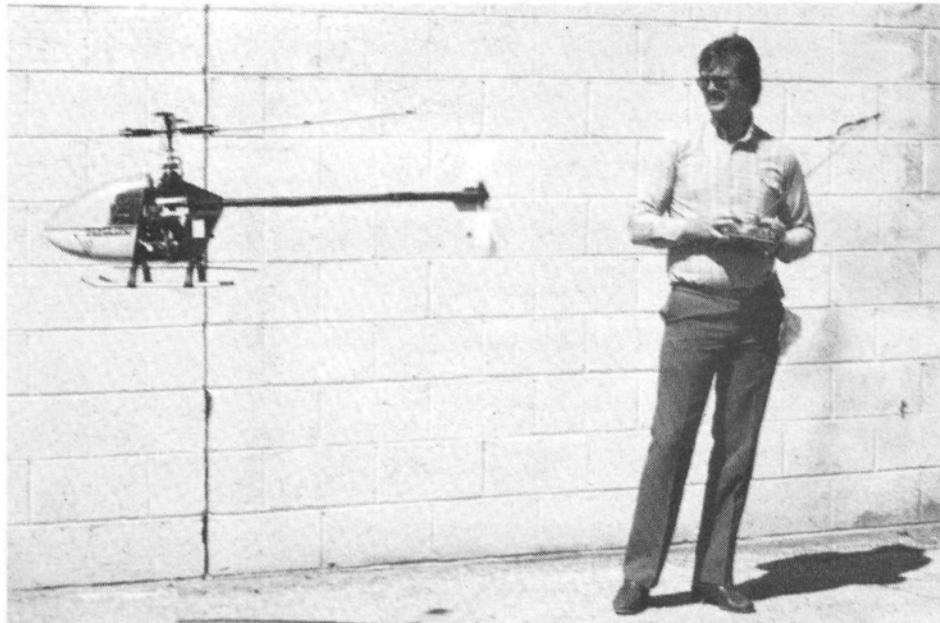
Helicopter Challenge

by CRAIG HATH

THE ABSOLUTE CHALLENGE of radio control is the successful handling of the model helicopter. Without a doubt, I've found more growth while learning more in this hobby from helicopters than from any other activity I've thus far taken part in, which includes a little of everything. Modelling helicopters involves so much attention to the finer details of the mechanical operation and maintenance that it can push you to learn more and more. There seems to be a force that compels one to grasp the why's and why not's of helicopter flight—at least this is true for me, and for many of the friends I've acquired through involvement in this hobby.

I am a modeler. My first experience with models was at the ripe age of five when my father bought me a Comet Piper J-3 Cub and helped me build it. I started flying helicopters about five years ago and have since found them to be my nemesis. Two years ago, I got the opportunity to go to work and use the education I have in marketing in the hobby industry. There are so many people wanting to get started in this hobby but they're without direction and needing answers to so many questions. I'm hoping to make a contribution to the hobby by explaining all about the right way to get going.

What exactly will this column be about? Well, I feel that most of the more advanced fliers already know about the latest widget, and how to use it, or at least have some idea of what the widget is used for and what to do with it. This column is for those who want to fly their machine, learn more about their machine, or those who just may be curious about helicopters. I'll take you step by step through the entire learning process, all the way to advanced aerobatics. If you have questions on something that I'm not covering, by all means write in and I'll get an answer to you.



Author Hath tests out his new Kalt Cyclone which will be covered in more detail next month.



Pre-flight maintenance is important if you prefer to fly instead of repair.

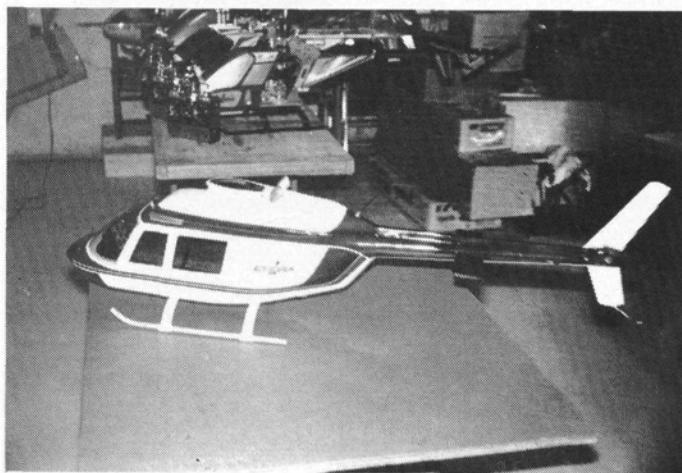
I'd like to start with a listing of what items are really necessary to get you started in this hobby. Before buying a kit, find out what is required to complete it, and make a list of these items. I'll spend some time on this in the next issue; it will be a sort of buyer's guide on what are some of the best options for kits available to the beginner with a no-nonsense listing of accessories for each particular model.

In the meantime, I'd like to leave off with some fuel for thought when considering types of helicopters to begin with:

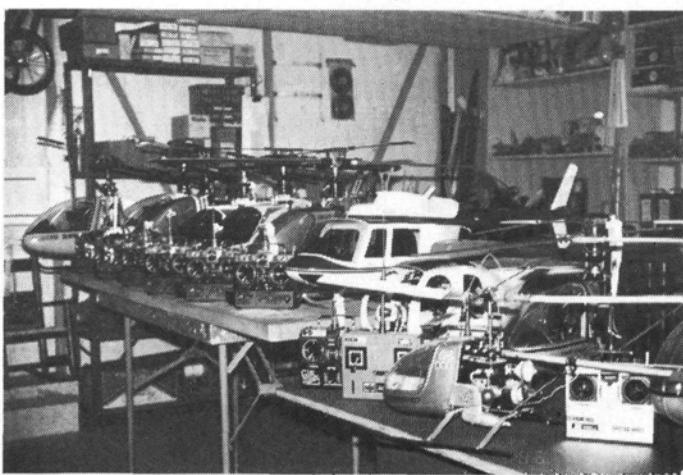
1. The helicopter should be a collective-pitch design, which means that the rotor blades will mechanically change pitch or angle of attack via a linkage and radio control. This changing of pitch along with application of throttle will increase and decrease lift, or the rising and falling of the helicopter. I feel that this system gives the pilot much quicker response to the throttle stick and allows him to learn much more easily. Since most of the kits



The Cobra Jet Ranger from GMP is a frequently modeled scale subject. This one belongs to Bob Pickens.



Bob Pickens' workshop could pass for a hobby shop.



The versatile Baron 28 on floats is a great beginner's helicopter because of its low cost and consistent performance.

on the market today are collective pitch, you won't have any trouble finding a good one.

2. Get to know your first helicopter as well as possible. If you're lucky, you'll be able to find a used model assembled and ready to go; but be sure it has the manual and exploded view with it—and never discard these. The time will come when you'll need them for reference, no matter how accomplished you become at repairing your machine. And, incidentally, a copter can always be repaired for much less than the cost of replacing it.

3. Purchase a model that you can get parts for, especially if you're considering a used model. Repair and maintenance can become impossible if parts are unavailable. When you are purchasing a new kit, take the time to find out about the availability of spares, and where to get them.

4. Your radio system should be designed for helicopters. I'm not saying you can't fly a helicopter without a helicopter radio—because you can—I'm only saying that it's a lot easier to set-up-and-fly with the new helicopter-designed transmitters. Another recommendation that I always make is to buy the best radio that you can afford. In the long run, you won't be sorry. The radio systems on the market today are truly miracles tailored for our purposes. Another question that I often hear asked is, whether a helicopter transmitter can be used for airplanes. The answer is, yes it can. When purchasing a helicopter radio system, always remember that you'll need to buy a fifth servo. The extra servo is a must if you intend to take advantage of the helicopter features that are built-in to the system.

5. Concerning gyros and higher capacity airborne battery packs, I feel that you'll probably learn faster if you're using a gyrosensor. A gyrosensor is an electro-

(Continued on page 88)



Radio-Control

by ART SCHROEDER

THE BYRON Originals* team in Ida Grove, Iowa, has become accustomed to their staggering achievements. They have had success after success that can stem only from creative ideas, planning, dedication, and hard work. Starting with their first kit, a $\frac{1}{3}$ -scale Pitts Special in all foam and powered with a .60 on belt drive through highly practical ducted-fan jets, a $\frac{1}{5}$ air force seemingly bent on making all World War II fighter designs available to modelers and their "Striking Back" spectacle; everything Byron does has a quality result.

One would imagine that it would become easy in Ida Grove to say, "Ho hum, so what do we do next?" However, the team could not have been at all blasé over their latest aeronautical accomplishment. The $\frac{1}{5}$ -scale B-29 has flown successfully in a classic "off-the-bench" flight. Make no mistake, this is a model for which no superlative is too strong. It is bigger than many full-scale airplanes; it is powerful, heavy, realistic—and it does fly!

Marc Jensen of Byron Originals reports:

"Our huge $\frac{1}{5}$ -scale B-29 bomber made its maiden flight on Wednesday, August 20, just a few days after it was originally scheduled to fly during Fun-Fly '86. And what a successful and exciting flight it was!"

"The 383-pound scale model, powered by four specially built 100cc Quadra engines, rotated in less than 175 feet of runway. With Ken Bryan at the controls, the B-29 made three wide circles around the field and was brought in for a flawless landing right down the centerline of the runway. Thanks to its hydraulic landing gear brakes on a separate radio system being controlled by Byron [Godberson], the big bomber was brought to a complete stop just 200 feet after touchdown."



Ralph Pearson's Shorts SD3-30 Commuter shown several months ago. Now it's finished and quite spectacular. Weight is under $5\frac{1}{2}$ pounds.



Byron's latest behemoth, a 383-pound, 28-foot, 9-inch span B-29. Uses four 100cc Quadra engines swinging 38-inch four-bladed props. Has self-starters, operational flaps, bomb-bay doors, retractable tail skid and pneumatically retractable landing gear. Byron Godberson on left and Ken Bryan on right.

News

"It's hard for most to appreciate the amount of time spent planning, designing, and actually constructing an aircraft of this size and complexity, but we've so far put in well over 1½ years on the project. As in all our show and demonstrator aircraft, the B-29 followed all the normal kit aircraft stages from plug design, mold making, and actual fiberglass fuselage and nacelle layup. All panel line details are present in the fiberglass parts. Wings and control surfaces are sheeted foam cores. The wing-span on the B-29 is 28 feet, 9 inches.

(Continued on page 119)



With the exception of the missing cowl tops removed here on the first flight, it would be impossible to determine this airplane from one on a mission from WW II.

Hobby Horn

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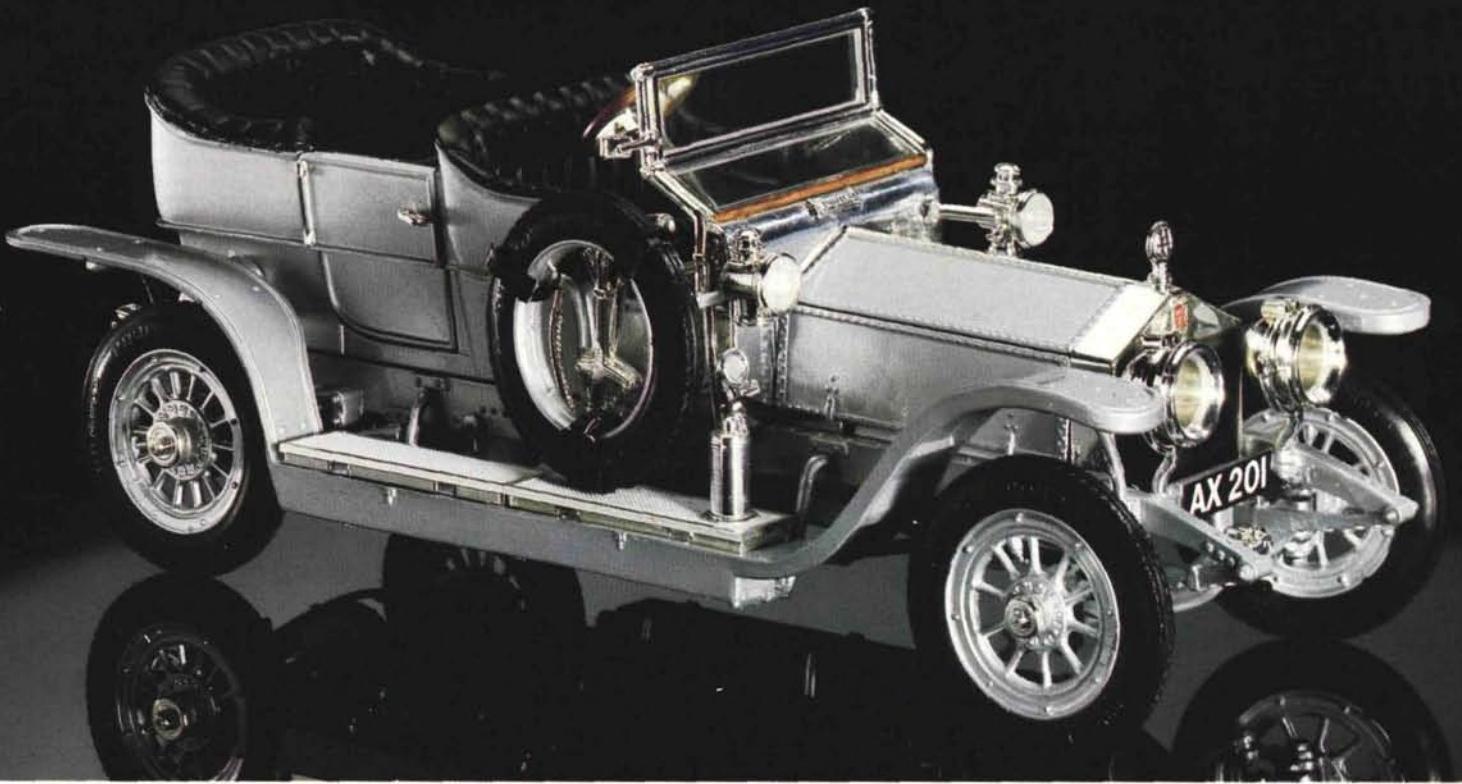
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Named for its silver-plated trim, metallic-silver paintwork and extraordinary silence, The Silver Ghost offered luxury and performance previously unknown. And the prototype for this die-cast model is based directly on first-hand studies of the original.

Steel dies taken from the prototype are used to cast the more than 127 components needed to build a single model.

The elegant *Roi des Belges* coachwork is painted with metallic-silver automotive lacquer. And the exterior trim is

plated with *sterling silver*—protectively coated—matching the original exactly.

There are soft tufted seats, doors that open and close, fully operable steering, complete instrumentation—and engine detailing that shows the *two* sparkplugs on each of six cylinders.

What price perfection? A custom model of this quality would cost hundreds or even thousands of dollars. But

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Crafted and imported exclusively by Franklin Mint Precision Models, it's available by direct application only. So be sure to order by February 28, 1987.

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GREAT RACE

(Continued from page 31)

Though there were successes, too. A helicopter under the pilotage of Steve Edgar rounded the course in grand style. Radio George outwitted Steiners Oak for the coveted "Dead Last But Finished" award. Fred Schwall took the gold in Great Race Special Class with an almost perfect 35:11 run.

Jim Pinchon was the first winner in the new Economy class, consuming 301cc of fuel over the course. Kirk Nelson won the first-place hardware in Sport class with a blazing 36:48.

There were lows as well. Gene Hughes was negotiating the Tunnel of Trees when his aircraft disappeared. It just simply vanished—and hasn't been found since. Jim Pinchon flamed dry only yards from the finish line in his bid for Great Race Special. The aircraft was later destroyed in a valiant second attempt. Ray Vega rounded the course using a measly 233cc of fuel only to be disqualified over a minor rule stipulation in Economy class. Brave Nathan repeated his wing ejection feat while attempting to negotiate the course with a seaplane in Novelty class. It wasn't the same wing he shed at

Forest Hill. There an unconfirmed report of a bull charging vehicles in the area in which John Sorenson stuffed his helicopter. There appears to be no connection, however.

The bull now munches contentedly in his pasture, amid grass that begins to cover any traces of man's machines having passed. The Towers of Doom lie still and grey.... In the distance the Tunnel of Trees becomes again a country road. But don't be mistaken—they're only waiting for the certain trumpets of The Great Race 1987, to call the vying pilots to glory once again. ■

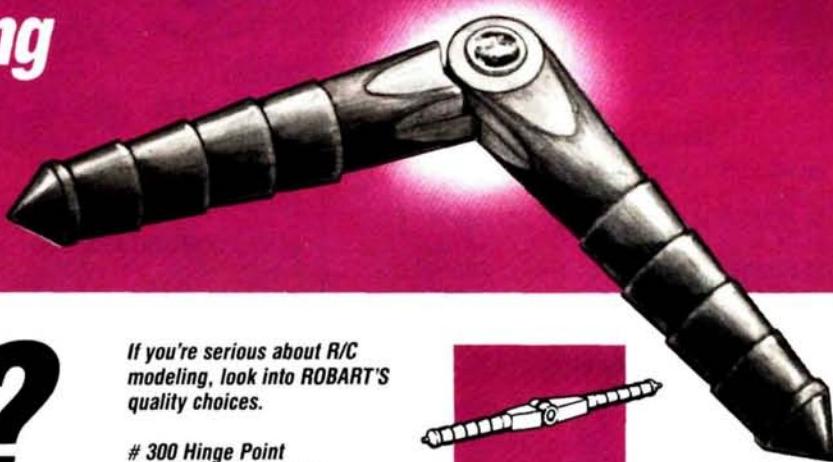
HELICOPTERS

(Continued from page 77)

mechanical device that detects movement and sends a signal to a servo to counter the movement automatically. The gyro is used on the tail rotor or yaw axis of model helicopters, because this is the hardest control to get used to for most people. So, in use, let's say you're flying the helicopter

(Continued on page 96)

Still chiseling slots for hinges?



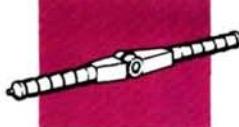
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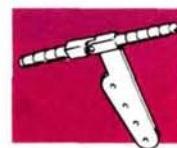
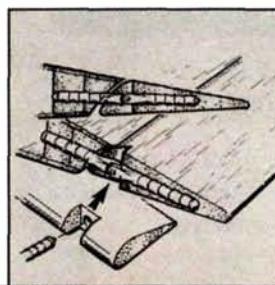
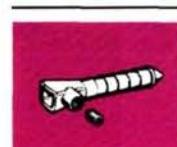
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Floating Around

by JOHN SULLIVAN

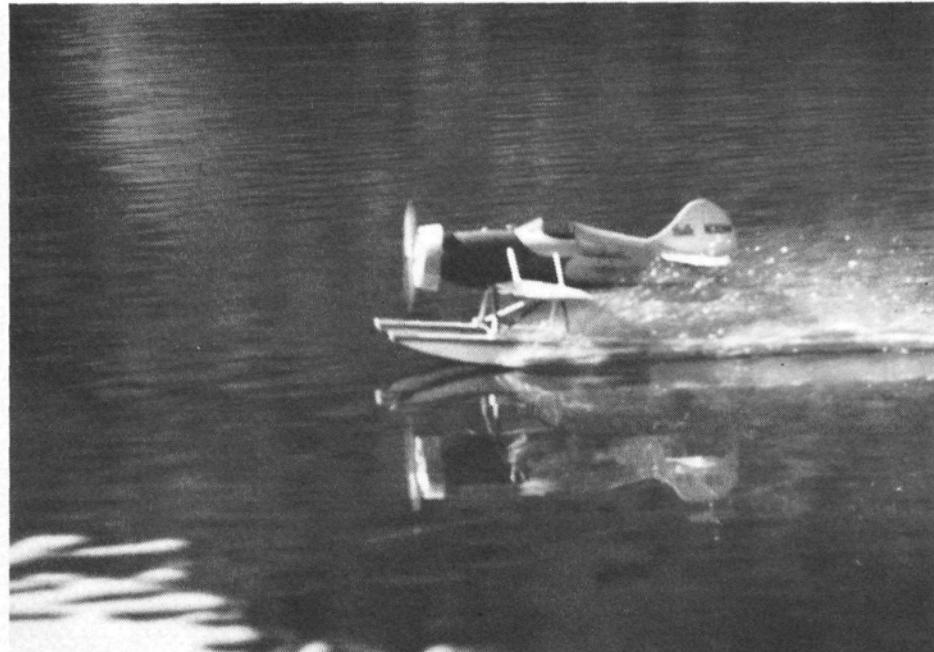
MAGIC. As modelers, we conjure up enough of it to fill Merlin's cap every time we fly. It's the stuff of charms and amulets and merrythought that binds us together as no other hobby can. A case in point, we were watching Mike Johnson fly his Gee Bee on floats over the lake a couple Sundays ago. The weather was dead calm. The lake was a mirror surrounded by silver morning mist, and Mike was flying one loop after another, slower each time around, bigger each time around, until the magic happened.

At the top of the last loop, 200 feet over the water, the Gee Bee went into a flat, inverted spin. Mike threw in every control he could think of, and then raised his hands in resignation to watch with the rest of us as the beautiful yellow and green scalloped Gee Bee slowly corkscrewed down...not much faster than a leaf or a feather. When such wizardry is afoot, the senses absorb every nuance of the thing we're watching. Everyone there had the same thought. We were witnessing a recreation of history, and the spell we were in allowed us a glimpse of tragedies past. We didn't know who was up there—one of the Granvilles, or Doolittle—no matter, the ghosts were with us.

And then it was over. Mike got in the boat and rowed out to his Gee Bee, which was floating inverted in the water. The price of the enchantment was small: a hairline crack where the stab meets the fuselage; so we fixed it, and flew again, and made more magic.

This month I have a couple of floatplanes so loaded with character that when either of them flies, everybody else lands and watches. In the case of Mike's Gee Bee, the finished product was not without its difficulties, and the changes Mike had to make to produce a reliable model are worthy of note.

Regular readers of this column will remember Mike's treatment of the strut-attach system in the June '86 issue. Two other modifications have been made, and



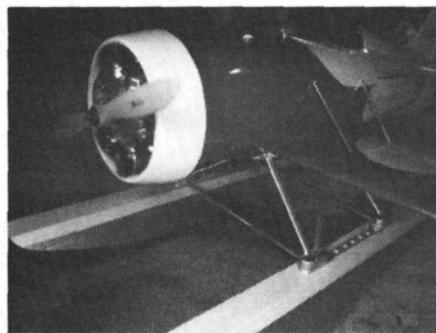
The Gee Bee on the step seconds before liftoff.

the most apparent is the enlargement by 25% of the fin/rudder area, along with the addition of a sub fin. This was done to counteract a tendency in certain floatplanes to snap, or water-loop, at the precise moment of take off. After 4 years of encountering this characteristic, I still can't find a reliable explanation as to why, for example, a Curtiss Robin needs a sub fin and a Cub doesn't. Whatever is happening, it's apparent that more fin authority is essential to correct the problem. In Mike's case, we figured the prospect of putting a short-coupled Thompson Trophy racer on floats was

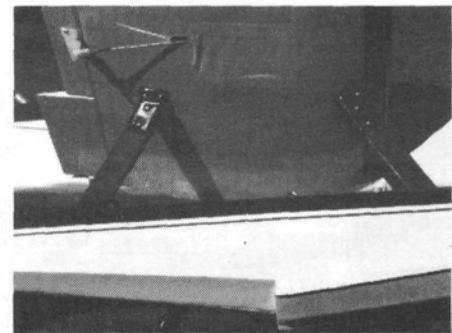
reason enough to add the sub fin before we ever put the Gee Bee on the lake.

While I'm on the subject of tailfeathers, I'd like to bring your attention to the water rudder on the Gee Bee. It's a 1x1½-inch piece of sheet metal soldered to a ¼-inch music wire extension which is Hot Stuffed into the rudder blank. A water rudder of this type has as much authority as twin rudders on the floats and practically disappears from view in flight. This is an expedient way to equip your first floatplane and also quick relief for a severe case of builder's fatigue.

The second modification to the Gee



Note an aluminum strut and spreader system for float attachment.

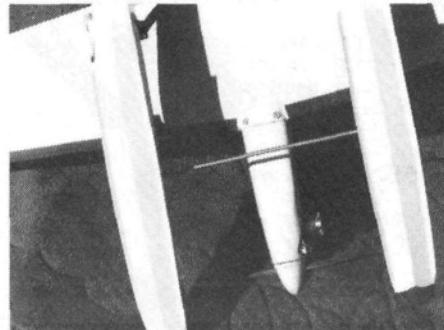


Sea Line 60 uses finger-joint strut attach system.

Bee came about after the first test flight when Mike discovered that the scale cowl with dummy cylinders and a Saito 45 swinging a 14x4 prop just wouldn't provide enough power. Mike and I share this penchant for planes that fly on their wings rather than their props. However, at 7 1/4 pounds and with a 30.9-ounce wing loading we lost the battle, so Mike installed an O.S. 60 four-stroke with a simple fiberglass ring for a cowl, and that combination provides more than enough power for realistic flight.

So, how does it fly? About as easy (or hard) as a Hobby Shack ARF Citabria with a symmetrical airfoil and 1/4-inch aileron throw. The Gee Bee on floats has a smooth way about it that belies all the shaking that's going on at the transmitter, and the message is that this is not a beginner's project. For those of you who want some real thrills, the built-up floats are 32 inches long with a 3 3/4x3 3/4-inch section at the step. The floats are spread 13 1/4 inches center to center, and the prop arc clears the float deck by 1 1/2 inches. By the way, we've discovered that if you put the Gee Bee into a flat inverted spin you need to chop the power, to neutralize the controls and then roll it out, and 100 feet of altitude.

The second floatplane featured this month is also a thrill. It's a Sea Line 60 pattern ship built by Gary Emerson of Santa Rosa, California. Gary has years of experience flying IMAC unlimited and F3A Turnaround, and has also served as CD and organizer for AMA events. It's



Underside of built-up floats shows modified tri-hold system to reduce spray.

important to mention Gary's background since my understanding of performance-oriented aircraft became hermetically sealed after the introduction of the 12% Clark-Y airfoil.

Gary's Sea Line 60 was built from one of three kits that were imported by Golden Gate Hobbies on a trial basis. It's a Japanese kit of all built-up construction with coupled flaps and spoilers in addition to the usual control functions. The floats, struts, spreader bar, and complete hardware package are all included in the box, which Gary claims was one of the finest kits he's ever built. Wood quality, parts fit, construction design and performance were all excellent.

Gary powers the Sea Line with an O.S. 60 side-exhaust coupled to a Mac's tuned pipe through a home-made header and swinging a DW 11x7 prop. The symmetrical 65-inch span plane weighed in at 9 3/4 pounds (23-ounce loading) after covering it with 3/4-ounce glass (2-ounce on the floats) and a lacquer finish under clear



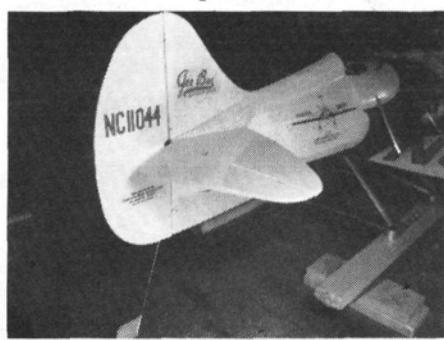
The Sea Line 60 has a mean, racy look, but is a real puppy on water.

Imron. Guidance is by J.R. Radio.

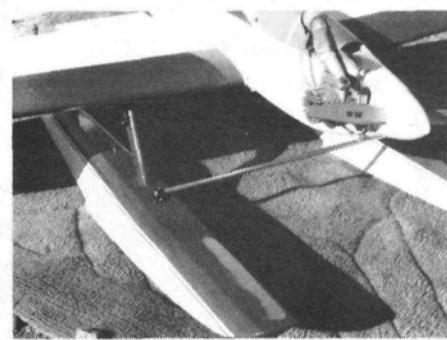
This is the kind of plane you hesitate to step in front of even with the engine off. It looks mean and has superb flight characteristics. Top speed is just a tad under a fixed-gear pattern ship at 80 mph with adequate vertical performance. Gary claims no difference between the Sea Line and a fixed-gear ship, with the exception of vertical snaps where the presence of the floats makes the maneuver less violent. Other than that, it tracks very well, stays on headings and requires a little rudder in knife-edge just like its land-bound cousins.

A lot of engineering has obviously gone into this plane. The stepped flap/spoiler/aileron outline along with the inverted fin (which doubles as a water rudder) are unique; and the bolted finger joint float struts and single spreader bar arrangement are one of the cleanest and strongest setups I've seen. The only problem, as I see it, is that the plane is presently

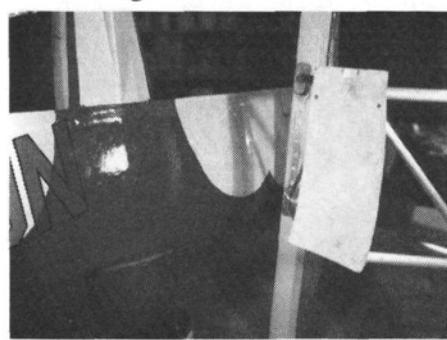
(Continued on page 103)



Water rudder should be submerged while taxiing and clear when on step. Note 10° trail back.



The Sea Line 60 uses single spreader bar just forward of front strut.



Molded Gee Bee belly pan attaches with two screws. Silicon wing saddle keeps water out.

HELICOPTERS

(Continued from page 88)

and the nose drifts to the left. The gyro will then automatically signal the rudder servo to add right tail pitch and correct the drift while you spend your time trying to keep the helicopter level with cyclic control, assuming that the gyro is installed and adjusted properly. When using a gyro, the current drain from the airborne battery pack is increased. Use of a higher capacity battery is recommended, such as those rated at 1000-1200 mAh, instead of the standard 500 mAh-rated that is included in the radio system.

Please stand by till next month, when I'll get further into the right way to get started. ■

TRYSTAR

(Continued from page 69)

In about three hours, one (even a rank novice) can have a multi-colored, slick-looking trainer on his workbench. The assembly speed comes from the absolutely finished, accurate parts (no painting at all, though a couple of vinyl transfers are needed) and clever kit design.

Radio installation is eased by prepared ply mounts keyed to fit in the appropriate place in the fuselage. All pushrods are prepared to exact length and instructions for their use are very clear. Receiver and battery pack are packed into their place loosely sheathed in foam rubber. Don't use the plastic foams, rather only natural rubber foam. I feel this material is the only one that completely suppresses vibration. Servos are mounted by screws through rubber grommets. Be sure they are a little loose; no real movement when you press on them with your finger but, certainly, there must be a definite flexibility.

FLYING. Trystar flies well and is very suited to any beginning modeler. I could find no nasty characteristics. On rudder control, turns are positive and predictable. In fact, Trystar would fly fine as a rudder-only airplane, which was proven when the elevator servo failed on one test flight yet the plane was safely landed. The airplane has no nasty stall tendencies. Trystar utilizes an airfoil that has a slight curvature on its bottom forward third. This slight move toward a semi-symmetrical airfoil seems to eliminate any undesirable ballooning tendencies that some flat-bottom foils seem to exhibit.

Even with all this built-in stability and very soft flight qualities, I would suggest that first flights be flown with the aid of an experienced R/C flier. The Trystar can be flown by a rank novice, but the first suggestion is far better.

So give Trystar a try. You may indeed find the wonderful world of R/C much to your liking. Let's hope I see you at the flying field.

*The following are the addresses of the companies mentioned in this article:

Varicom Industries, 18480 Bandelier Circle, Fountain Valley, CA 92728.

Satellite City, P.O. Box 836, Simi, CA 93065. ■

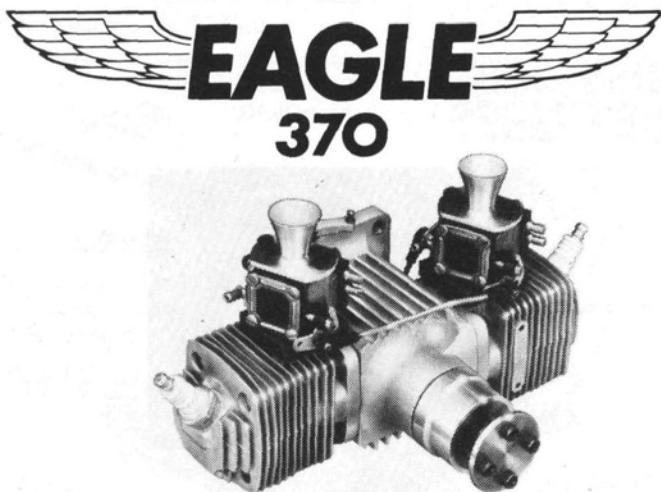
NORTH STAR

(Continued from page 42)

Once all the touch-ups were complete, I again installed the radio and engine. Complete, my North Star weighed in at just under 6 pounds, ready to fly!

FLYING. Since the North Star is a one-piece model, no field assembly is required. I gassed the plane up and started the engine, and was ready for a taxi test. Ground handling is outstanding. Pointed

(Continued on page 103)



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Pattern Matters

by MIKE LEE

IT'S INEVITABLE—and a lot of us have dreaded seeing it come—but the ARF pattern birds are here. I mean true, fire-breathing, and performance-capable pattern birds. By the time you read this, ads will be appearing for them, so let me give you the inside scoop on a couple of them first before anyone else does.

The first one to come out is Hanno Prettner's Supra-Fly kitted by EZ and marketed by Hobby Shack*. Yup, it's one of the EZ series kits, a ply, balsa, and laminate skin aircraft. This ship is a .60-powered pattern bird, with the engine mounted in a slanted-down side position on the right. This position allows the pipe to go under the plane, down the belly.

The EZ Supra-Fly can be assembled in a couple of evenings, because there are just a few parts to put together. The end result is a tail-dragging ship with air brakes mounted to the retract legs and only five channels required.

I saw veteran pilot Steve Helms flying one of the prototype ships at a pattern meet. This particular bird had over 300 flights on it and still looked great. I thought the firewall wouldn't hold up to the torture of a piped .60 engine, and Steve agreed he had at first had similar misgivings. Not only did the firewall hold up, but the plane does perform like a pattern bird should. All modes of flight looked good, and Steve capably took the ship to third place out of eight in FAI Turnaround.

The next kit is also a pattern bird and, again, it's by the EZ people and Hobby Shack. This time, it's T. Yoshioka's DASH 5-45, his latest FAI bird. I'll tell you, it's beautiful. The whole ship looks like a hand-made plane should. I mean *I want this airplane!* And fly? Gosh, this bird flies like a wooden or fiberglass ship ought to, except it's an ARF EZ bird! And I want it!

Guys, the ARF ships are here and the



T. Yoshioka with his DASH 5-45, which is now an EZ kit from Hobby Shack.

people at EZ and Hobby Shack are making a major power play at us. Look for Field & Bench Reviews on both the Supra-Fly and the DASH 5-45 just as soon as I get them to review.

Hanno Discusses Turnaround Changes

Recently I had the occasion to talk with World Champion Hanno Prettner. Most pilots, whether pattern or sport fliers, know the name and reputation of this fine modeler. Hanno was in the States for the Hobby Shack Four-Stroke Scale Contest in Riverside, California.

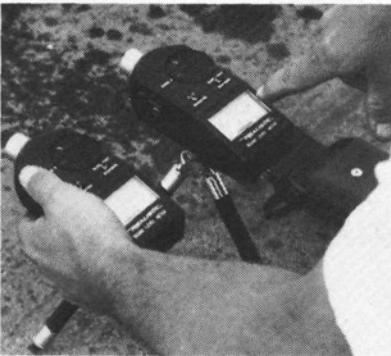


Hanno and Hans Prettner proudly display the Supra-Fly, now also in EZ kit form.

A couple of the subjects we discussed might be of interest to you as they relate to what I talked about last month, the FAI Turnaround Schedule. Specifically I mentioned the new rule changes that affect the box definition, noise restrictions, and the pattern itself. Amazingly, Hanno's viewpoints are similar to the opinions I had expressed.

As far as the box definition, Hanno says that he agrees with the decision in that it clearly defines what the judges should be looking for and at what distances. I've noted before that the European and Asian pilots have taken full advantage of lax box restrictions by flying very far out and stretching the Turnaround maneuvers to the extreme.

As for the subject of noise, Hanno feels that the new method of measurement is also very good. It will insure that a pilot goes to the flight line with a quiet bird and no chance to cheat the system. However, he also agrees with me that the ability of the judges to award bonus points for very quiet planes or penalize loud but qualified planes as excessive power to the judges. My thought was to allow a maximum of 5 points award or penalty only. Hanno agrees. Nice to know we're on the right track with a real pro.



Sound testing of engines is now part of the FAI rules.



Steve Helms undergoes sound testing prior to FAI pattern flight, now an accepted inconvenience.

Lastly, we discussed the FAI schedule itself. I agree with the discussion that Ron Chidgey authored, which suggested a change in the schedule every so often. I believe Ron mentioned every two years. I think every three years would be right, and apparently the World Champ likes every three years too. This would mean that the first year of a World Championship meet most pilots would be fairly well-practiced. In the next meet, which is every other year, the pilots would be just stepping into the new schedule. And that same schedule would show up for the third meet two years later. After that, the cycle repeats and you end up with a well-rounded program.

At any rate, it was nice to have a chance to talk with Hanno.

Circus Hobbies JR

My last goody this month has to do with a sneak preview of the latest super-radio to hit the market, the JR from Circus Hobbies*.

This radio is microprocessor controlled; that is, the signal encoding

section as we know it is computer controlled. What this means is that we can make this radio do all sorts of things. For example, this radio can transmit on either AM or FM! That means that this radio should be able to survive in any interference-prone situation simply by switching the type of modulation and the receiver.

Next, this radio is fully programmable to do virtually anything possible found in any radio today, but it goes a bit further than just bells and whistles. The big deal is that you can set up any of your birds and flight-trim them, but you can also program the transmitter to remember all settings you just made in memory and then forget retrimming!

In other words, you take your trainer ship and trim her out. The trim levers are all over the place, but the plane is flying right. Place the settings into memory and now go to the pattern ship. Put all trims to neutral and then put the pattern bird up. You retrim the pattern bird and place the settings into memory. This is the second plane the transmitter has remembered. Now reset the trims to neutral and by calling

up the memory on plane number one, the transmitter has all the trims set already and the bird flies like the trims were never touched. And you still have full trim authority from the transmitter!

This JR radio is fantastic. An LCD readout tells what bird the transmitter is flying, what settings or mixing circuits are active, and a whole lot more. Best of all, the transmitter is compatible with any other receiver currently out by JR. Hanno Prettner was using this radio at Riverside when I saw it, and it is the most impressive radio I've seen to date.

I guess I've really rambled on this month about FAI, ARF's, and AM/FM. The above items are all exciting things for the pattern pilot and it's about time.

'Til next month we're on the pipe and airborne.

Mike Lee, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897.

*The following are the addresses of the companies mentioned in this article:

Hobby Shack, 18480 Bandelier Circle, Fountain Valley, CA 92728.

Circus Hobbies, 3132 S. Highland Dr., Las Vegas, NV 89109. ■

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NORTH STAR

(Continued from page 96)

into the wind, the aircraft rolled 30 to 40 feet down the runway, and became airborne. Once in the air and trimmed out, I was surprised at just how stable she is. After a few passes for photographs, I pulled out the stops—there isn't anything she cannot do, except for spins. I tried between 10 to 15 times to get her to spin, but with no luck.

The one maneuver the North Star will do that many other models cannot do is vertical descent. This has to be seen to be believed. Without a doubt, the North Star is a winner. I can't wait to fly her off water! Balsa USA has done it again!

*The following are the addresses of the companies mentioned in this article:

Balsa USA, P.O. Box 164, Marinette, WI 54143.

Satellite City, P.O. Box 836, Simi, CA 93065.

Hobby Lobby Int'l., 5614 Franklin Pike Circle, Brentwood, TN 37027.

K&B Mfg., 12152 Woodruff Ave., Downey, CA 90241.

Top Flite Models, Inc., 2635 S. Wabash Ave., Chicago, IL 60616.

FLOATING

(Continued from page 93)

unavailable in the USA. Gary bought the other two kits and sold them locally to George Graff and Bill Bisel in a flash.

Floatplane flying ranks 6th in the States in modeling activities out of 15 categories, and interest is on the rise. Perhaps with numbers like that (or orders), we could convince Golden Gate Hobbies to stock the Sea Line once again. These are the same people that distribute Y.S. engines, Hatori headers and the Atlanta and Dash pattern ships. You can contact them in the East at 914-248-8603 and in the West at 415-952-3045.

If all goes well, I'll have the low-down on amphibians for you the next time around. Till then, get wet, land upwind, and stay happy.

John Sullivan, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897.

dress up the bird as icing on a cake. I sprayed on a light coat of acrylic lacquer auto primer then sanded with wet 400 paper. The base color was then spayed on and the red trim applied. Black striping tape and some decals finish the job.

I put everything back together and admired the finished job. Weight at this point was 9½ pounds.

FLYING. Out at the local flying field, I filled the tank and admired once again the beauty of the Robin. I'd never before flown a four-stroke and this would prove to be an experience. I fired up the Enya 120R and put my trusty tach on it; the rpm was the same as it had been on the stand—I didn't even have to touch the needle valve! With the engine running I rechecked all radio functions and now there were no excuses for delay: it had to be flown.

Our field is at 7,200 msl and I anticipated using about half of our 450-foot runway. But I was wrong! The 120R leapt from the ground within 75 feet with a straight-out climb. My heart quit thumping as I flew around and realized that no trim was needed and I had come back to two-thirds throttle. This airplane flies...as if on rails. I think the big ventril fin has a lot to do with it. Rolls are like they're on a string. I selected aileron half-rate on the transmitter and it became a pussycat. After a few touch-and-go's the ship lands

(Continued on page 104)

ROBBE ROBIN

(Continued from page 73)

line and here we find it as a rather low-priced radio. Installation of the radio is easy because everything is out in the open and the servo-reverse makes it even easier. The S28 servos have more than enough torque for an airplane this size. And there are no extra goodies to purchase.

Prior to finishing, I added all the external details, which are supplied—miniature screws, steps, canopy handles, tail skid—all the items that are sure to

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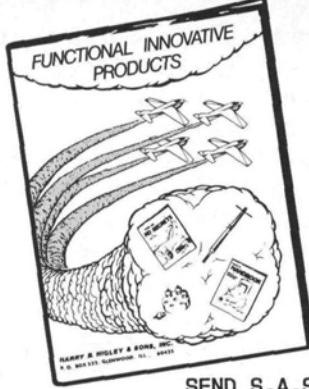
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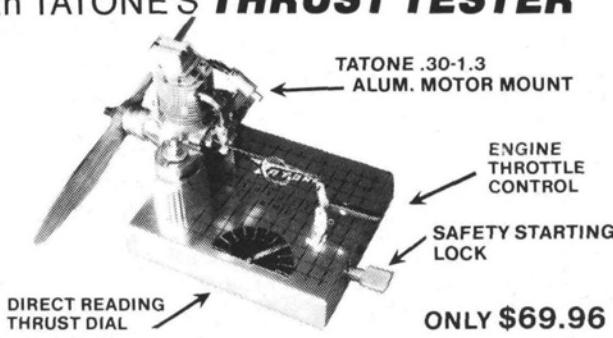
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ROBBE ROBIN

(Continued from page 103)

like a dream, rock-steady, on final and touchdown. It reminds me of the F-120s I used to fly; just drive it home.

To say that I was pleased with this combination would be an understatement. I couldn't have wished for a better machine, radio and engine. Try one and see.

*The following are the addresses of the manufacturers mentioned in this article:

Robbe, 180 Township Line Rd., Belle Mead, NJ 08502.

Enya: distributed by Altech Marketing Inc., P.O. Box 286, Fords, NJ 08863.

Futaba Corp. of America, 555 W. Victoria St., Compton, CA 90220.

K&B Mfg. Inc., 12152 Woodruff Ave., Downey, CA 90241.

Zinger: distributed by JZ Products Inc., 25029 S. Vermont Ave., Harbor City, CA 90710.

Hobby Poxy, P.O. Box 378, Borough of Rockaway, NJ 07866.

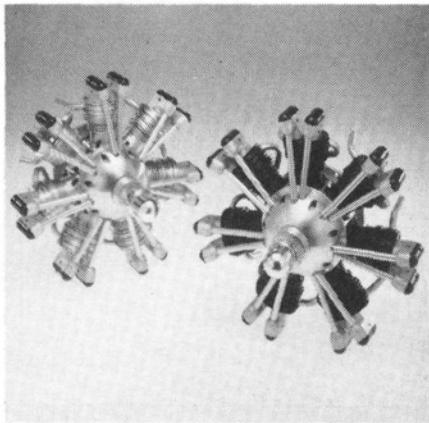
Royal Products, 790 W. Tennessee Ave., Denver, CO 80223.

SAITO FA-80

(Continued from page 45)

The FA-80 is no heavier than the FA-65. In fact, the bare engine is 7 grams lighter but the bigger muffler is 6 grams heavier so the total weight is almost exactly the same at an actual 533 grams or 18.8 oz. Although this checked weight is more than the advertised 485 grams, it should be noted that it establishes the FA-80 as by far the lightest four-stroke engine of its size on the market at the present time. The manufacturer has claimed, in some advertisements, a lively 1.3 horsepower (rpm unspecified) for the FA-80. It will be interesting to see whether this high level is confirmed by tests and flight performance.

Peter Chinn, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.



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- Flying rpm 8500



Soaring News

by JIM GRAY

THE COLUMN this month will be devoted to the efforts of one man, Pete Richardson* of Costa Mesa, California. Pete and I corresponded back in early 1986 about a new sailplane design that looked promising: the Vulture Mark III. This is an original design and, well—let Pete tell you about it:

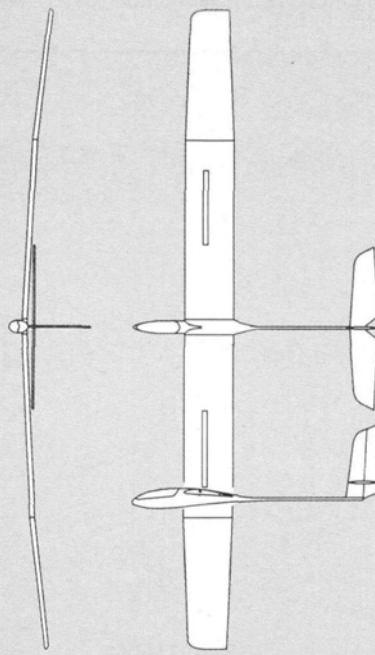
"...This sailplane was originally designed in the summer of 1979, and it took about three years to complete Mark I. This was a tee-tailed version incorporating a balsa-and-plywood fuselage, and one layer of $\frac{3}{4}$ -ounce fiberglass over the entire fuselage. The original fuselage was damaged two weeks before a large contest, so I built a new one in a week and a half, and called it the Mark II. The new fuselage was essentially the same as the Mark I, but I made a few changes elsewhere. The stab thickness was increased from 5% to 10% and was placed lower on the vertical fin, only $2\frac{1}{2}$ inches up from the top of the fuselage. This was an attempt to lighten the tail and reduce nose balance-weight. Both of these aircraft weighed 70 ounces.

"The Mark III version has a pod-and-boom fuselage; the boom being a carbon-fiber golf club shaft: $\frac{1}{2}$ -inch o.d. at the fuselage and $\frac{3}{8}$ -inch o.d. at the fin, with a constant wall thickness of $\frac{1}{16}$ inch. The pod is made of S-glass/Safety Poxy over a foam plug with a $\frac{1}{4} \times \frac{3}{8}$ -inch Flitespar* longeron on each side of the pod. The plug was built-up over a balsa keel and formers; the foam was sanded down to the formers, the longerons placed into slots, and the glass layed up over the plug. The canopy was cut out after five layers of 3.8-ounce glass cloth and resin had been applied and cured. The foam was then sand-blasted out. The Flitespar longerons that run from the nose to the middle of the root rib were positioned just below the canopy opening, replacing the strength that was lost when the canopy was cut out. Some thin glass matting was placed inside on the bottom half of the



The Vulture Mk. III by Pete Richardson, above, is unusual yet interesting. See text.

Vulture Mk III

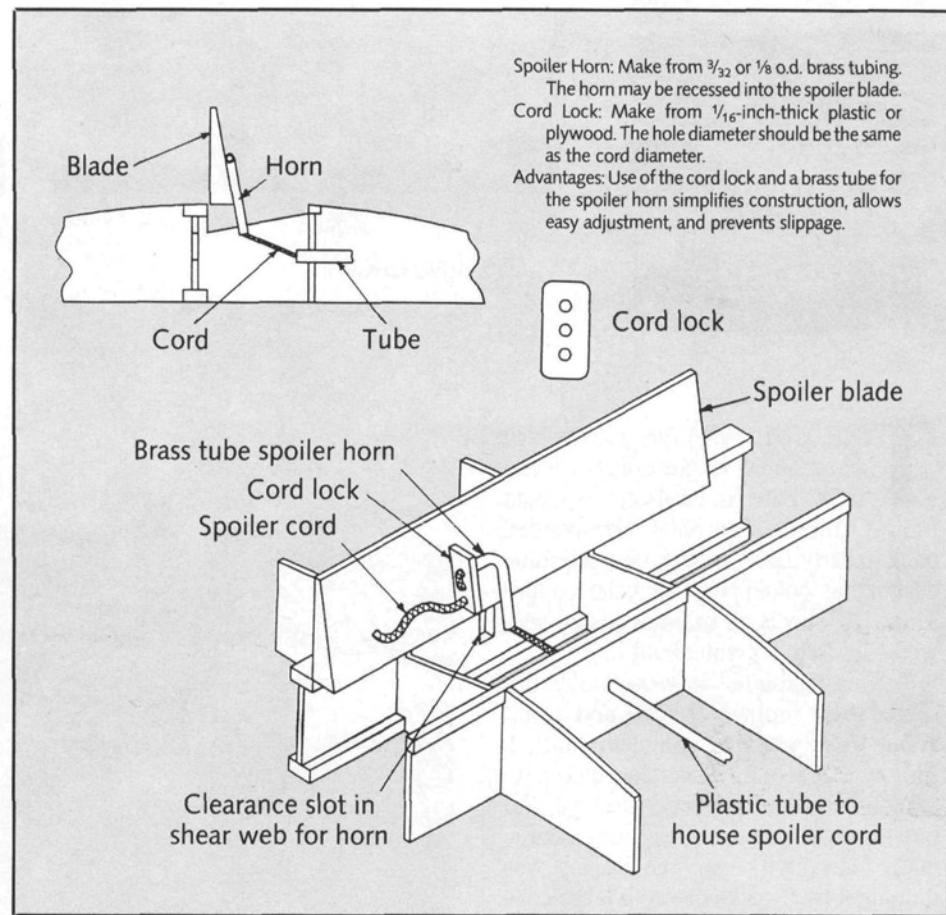


Wing span: 127 in.
Wing area: 1211 in.²
Aspect ratio: 13.3
Airfoil: Eppler 193
Weight: 72 oz
Wing loading: 8.6 oz/ft²
Stabilizer span: 32 in.
Stabilizer area: 143 in.²
Stabilizer airfoil: NACA 64009

fuselage to reinforce the area around the tow hook and skid.

"The wing (which also was used on the Mark I and II versions) uses an Eppler 193 airfoil, and is a built-up structure consisting of a 36-inch inboard panel and two 24-inch tip panels. Both the tip and center-section panels have $1\frac{1}{2} \times \frac{3}{8}$ -inch spruce spar caps top and bottom, and are fully sheeted top and bottom with $\frac{1}{16}$ -inch balsa. The wing joiner is an $8 \times 1\frac{1}{2}$ -inch titanium rod. Ballast tubes of $12 \times \frac{3}{4}$ -inch diameter aluminum are located at the rear of the spar. On the Mark III, a higher aspect ratio fin and rudder were used, and the Mark II full-flying stabilizer was placed 3 inches above the boom. The Mark I and II versions had 18-inch flaps placed next to the wing roots for landing control, but these were not very effective, so spoilers were installed and the flaps removed.

"Because the wing was already sheeted, the access for the spoiler installation was limited; so, a rectangle the size of the spoiler blade was cut in the top sheeting just behind the spar. I drilled a hole in the ribs from root to spoiler bay just behind the lower spar cap location, and routed the *inner* tube of a Golden Rod through these holes and out to the spoiler bay. I boxed-off the rear of the spoiler bay between each rib with $\frac{1}{8}$ -inch balsa sheet...but before the center rib bay was boxed-off, I bent the Golden Rod inner tube so that it pointed forward, and drilled a hole in the $\frac{1}{8}$ -inch sheet. The rod was pushed through the hole, and the sheet-and-rod combination were put into posi-



tion and glued, securing the rod and completing the boxing of the spoiler bay. A 6-inch length of Golden Rod was left hanging out of the root.

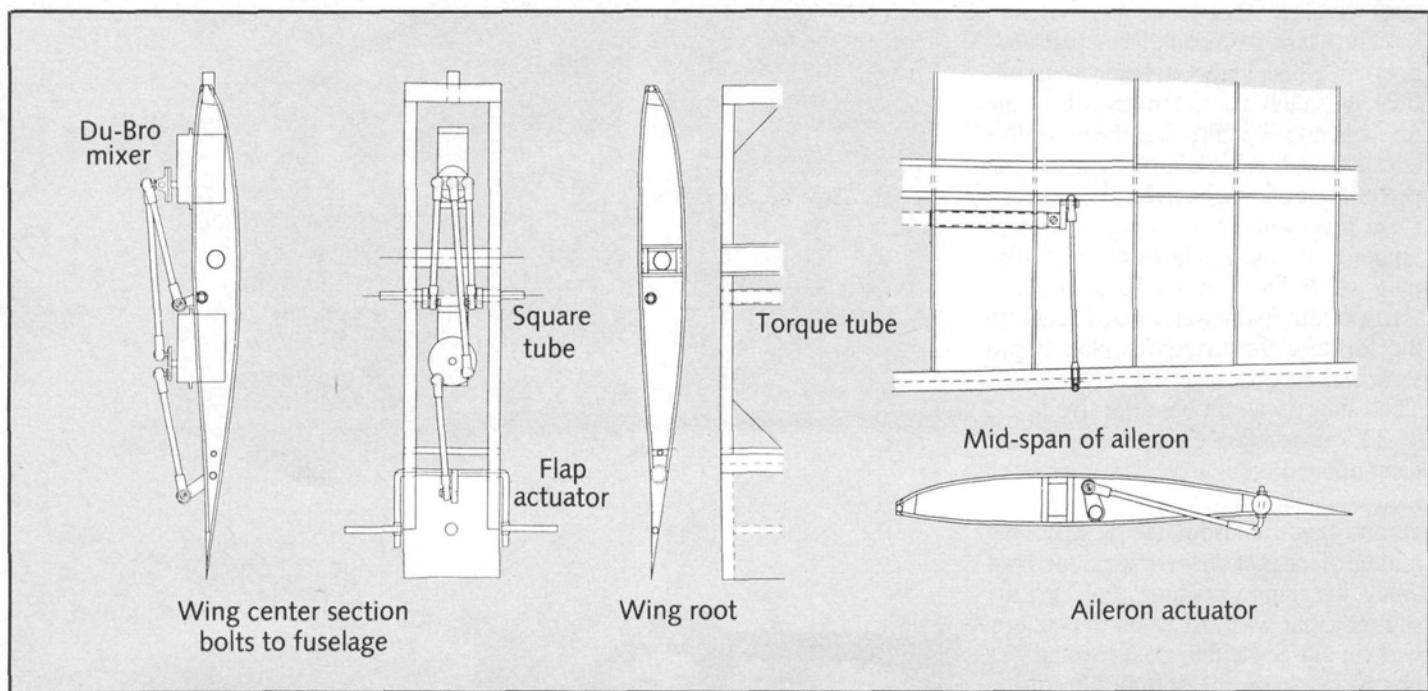
"Inside the fuselage, a red *outer* Golden Rod was placed so that when the wings are attached to the fuselage, the inner rod enters the outer rod and curves forward to

Spoiler Horn: Make from $\frac{3}{32}$ or $\frac{1}{8}$ o.d. brass tubing. The horn may be recessed into the spoiler blade. **Cord Lock:** Make from $\frac{1}{16}$ -inch-thick plastic or plywood. The hole diameter should be the same as the cord diameter. **Advantages:** Use of the cord lock and a brass tube for the spoiler horn simplifies construction, allows easy adjustment, and prevents slippage.

the spoiler servo, making hook-up of the spoiler cord to the servo arm much easier. The horn on the spoiler blade is a brass tube.

"I'm very pleased with the flight characteristics of the Vulture Mark III. Initial flights determined the CG location, which

(Continued on page 112)



FOUR-CYCLE

(Continued from page 52)

interested, we suggest that you write Dr. Walter Sturm*, the German gentleman who furnished Jim Everette with this information for current price and shipping, and availability.

As for a spark-ignition version, apparently there are no plans to make one available, but even better news is that a seven-cylinder, spark-ignition version is planned—it's expected to take two to three years to develop. It seems that the old saying about Rome applies equally well in Germany!

There is some question in my mind about the claim that drainage to the bottom cylinders has been eliminated. After all, gravity affects all liquids. The problem was never solved in full-scale aviation, where during the era of the round piston engines, your pre-flight included manually turning over the prop—one blade for each cylinder. Even in later years, with the 28-cylinder P&W R-4360, a man stood outside and counted blades for the engineer, who turned the engine over with the starter a given number of times before turning on the ignition.

As of this writing, there are no further details known, either by *Model Airplane News* or by Jim Everette. Should anything come our way, we'll let you Four-Strokeniks know here in the pages of "Four-Cycle Forum." In the meantime, your best source of information will be the man mentioned above.

Mail call this month brought a welcome surprise. And pleasant memories. To set the scene, picture a lush Caribbean island, a tropical sunset, cool breezes, palm trees, rum punches, steel band and calypso music, a grill full of fresh-caught lobsters, and just so you'll know that nothing was missing, the beautiful blonde was there also. Would you believe that the main subject of conversation was R/C model airplanes? I was there, Port Au Spain, Trinidad, with Cletus Berkeley, now the editor of "Propwash," official news of the Trinidad and Tobago Model Aircraft Club. The club boasts about 50 members, which isn't bad for any location, and hard to believe for one which (when I was there) had the nearest hobby shop located in Miami.

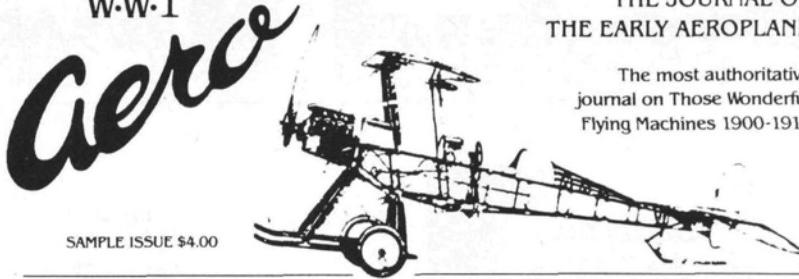
Cletus had quite a bit to say about the activities of this mid-oceanic group, but, specifically, he asked whether or not a review of the OS Gemini 120 Twin has appeared in the pages of *Model Airplane News*. A copy of papa Chinn's excellent

(Continued on page 110)

W.W.I Aero

(Continued from page 52)

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Product News



LANCIA DELTA S 4

Italian Rallye cars such as the Lancia S 4 have always been known for their aggressive styling and unequaled performance under rough road conditions. This Robby Car Kit from Robbe (180 Township Line Rd., Belle Mead, NJ 08502) features: assembled chassis, prewired speed controller and drive motor unit, 4-wheel independent suspension with coil springs, detailed painted scale-body with decals, high-traction scale rubber tires, rear-drive with enclosed gear box, battery box with 4 dry cell batteries, optional tuning sets available, 14½-inch length, and an assembly time of just one evening.



H.D. 12V STARTER

From Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820) comes easy engine starting! This reliable starter features a deluxe aluminum starter cone with a V-groove and rubber insert, a metal armature case with bronze bushings on both armature ends, and self-adjusting carbon brushes. The easy-press start switch eliminates the need for heavy finger pressure. Comes with large battery clips already attached and the built-in finger guard ensures safe starts time after time for aircraft, boats, helicopters and cars. See it at your local hobby shop.



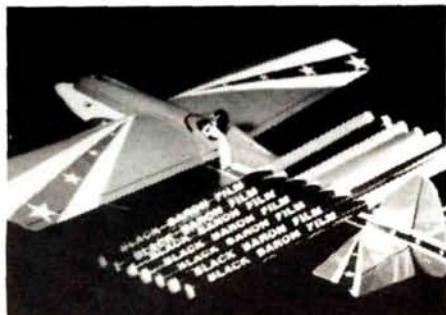
FOX .36BB and .40BB DELUXE MOTORS

Fox Mfg. (5305 Townson Ave., Fort Smith, AR 72901) introduces the .36BB and .40BB deluxe motors. Both are double ball-bearing, Schneurle ported, high-performance motors designed with a small lightweight case. Each motor is test-run at the factory and is shipped with carb needles pre-set for average R/C fuel, a custom muffler and its own 2-inch true-running metal spinner. Other features include: lightweight aluminum piston with special high-compression ring, MK-X style carb for easy starting, and fantastic top-end combined with a smooth, reliable idle. Get it from your dealer, or contact Fox.



SUPERTIGRE S-21, S-25 ABC ENGINES

The Supertigre S-21 and S-25 ABC engines from Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820) are great aircraft engines that provide superior performance and reliability. These engines are Schneurle ported and feature dual ball-bearing supported crankshafts, ABC piston/sleeve construction and include mufflers. Both are capable of .65 horsepower output; the .21 at 22,000 rpm and the .25 at 18,000 rpm. The perfect engines for the beginning or experienced flyer.



NEW BLACK BARON FILM COLORS

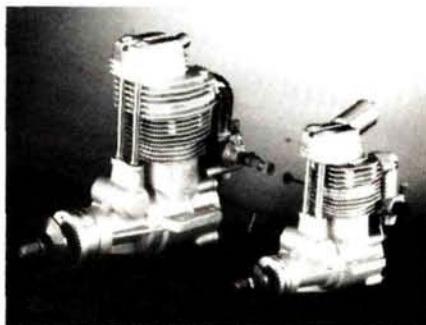
Two new colors, cream and Fokker red, have been introduced to the already successful line of Black Baron film, by Coverite (420 Babylon Rd., Horsham, PA 19044), making a total of nine colors available. Like the rest of the line, these colors also will feature high puncture-resistance, easy contouring, extreme sag-and wrinkle-resistance, high-opacity, and will go over foam because of their low working-temperature. The feedback on Black Baron film this past year has been great.



AIRBRUSH HOLDER

The model 125 Airbrush Holder holds two airbrushes of any kind, allows easy access to airbrushes, eliminates spills and accidents. Rotates and swivels, too, for maximum flexibility. Each side of the holder can be adjusted independently to provide the proper angle for both airbrushes. This unit clamps securely to any drafting table, desk or taboret edge up to two inches thick. When used properly, the model 125 provides a stable, level and secure spot to hold airbrushes that aren't in use. For more info, contact Badger Air-Brush Co. (Dept. MA-90, 9128 W. Belmont, Franklin Park, IL 60131).

Descriptions of new products appearing in these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News**, or guarantee of performance or safety by M.A.N. When writing to the manufacturer about any product described here, be sure to mention you read about it in **Model Airplane News**.

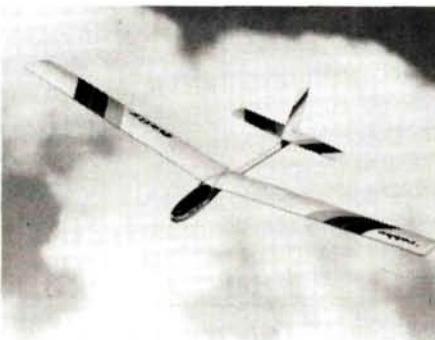


O.S. FS-40, FS-120, FS-48 SURPASS ENGINES

The new O.S. FS-40 Surpass and FS-120 Surpass Engines from Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820) are high-powered improvements of the popular FS-40 and FS-20 four-cycle engines. The FS-40 Surpass produces .65 horsepower at 12,000 rpm, 30% more than the FS-140. Moreover, the new Surpass can swing a prop at up to 15% higher rpm than the current version FS-140. Weighing just over 28 ounces, the FS-120 Surpass has an operating range of 2,000-12,000 rpm and can produce about 2.2 horsepower at 12,000 rpm, almost 15% more power than its predecessor. The new O.S. FS-48 Surpass is an altogether new engine. Similar in appearance and size to the FS-40 Surpass, the FS-48 Surpass can produce about .8 horsepower at 12,000 rpm, around 19% more power than the FS-40 Surpass. The FS-48 Surpass, weighing only 2 ounces more than the FS-40 Surpass, has exceptional power to weight ratio and should be very effective in those larger .35 to .40 two-cycle models.

MGA SCALE PILOTS

MGA Enterprises (P.O. Box 626, Fresno, CA 93709) announces their new $\frac{1}{6}$ -scale U.S. pilot figures fully dressed in removable flight gear of their time period. These 12-inch figures, weighing 6 ounces each, are fully poseable with movement at all joints, and are completely assembled, painted and ready for flight. The WW I pilot wears fixed helmet and goggles, and is dressed in removable leather-like flying coat, white aviator scarf, breeches, and knee-high fitted boots. The civilian pilot in this series is with fixed earphones, microphone, and wearing removable cloth flight-suit, fur-like trim and leather-like jacket and boots. The figures are authentic reproductions.



ROBBE ROFLY

From Robbe (180 Township Line Rd., Belle Mead, NJ 08502) comes the Rofly sailplane, which makes an excellent choice for the novice R/C glider pilot because of its size and features. The large wing chord is responsible for safe stall characteristics. The injection-molded sleek front section of the fuselage provides ample space for two-channel radio gear. The strong predrilled and preslotted anodized aluminum fuselage tube virtually eliminates incidence adjustment problems. The eggbox wing design features ready-to-assemble slotted leading and trailing edge, main strut and die-cut ribs. Additional shear webbing and planking produce a very strong one-piece wing. The tailplane frame can be detached by simply opening a screw. Features: wingspan 64 inches, wing area 453 square inches, length 39 inches, weight 26 ounces.



PIC POXY LITE, RESIN

Pic Poxy Lite from Penn Int. Chemicals (943 Stierlin Rd., Mt. View, CA 94043) is a 1:1 mix ratio A & B epoxy paste loaded with micro-balloons to provide 30% lighter weight than regular epoxy liquids, plus excellent sandability and carvability. The high viscosity of the system provides super fillet-forming without run-off. Use for making fillets, fairings, contours, etc. Ratings (using the copywritten PIC system): P (pot life) 6-8 minutes; H (handling time) 20 minutes; F (full cure) 2 hours. Recommended for use on balsa, hard woods, metals, plastics, fiberglass, composites and all combinations of these materials. Sold as 6 fluid ounce sets, metal tubes, supplied with tube-dispensing compression keys, available at most hobby stores.

TRU—TURNED MACHINED SPINNERS, PROP—NUTS



Tru-turn barstock spinners are so precisely made that when tested at speeds in excess of 36,000 rpm register virtually no run-out or vibration. This, in conjunction with its ultra-light design, eliminates engine damage associated with out-of-balance spinners. Available in standard sizes for both two- and four-stroke engines. To complement these, Romco Mfg. (P.O. Box 836, South Houston, TX 77587) has a complete line of precision-machined prop-nut and washer assemblies of alloy steel, not aluminum. This set includes a precision-machined aluminum spacer. The washer is piloted on the nut to give accurate torquing of propeller and a true-turning adapter. This new prop-nut set will adapt your new Tru-turn spinner to virtually any engine on the market.

FOUR-CYCLE

(Continued from page 107)

article on this engine (this magazine, April 1980) is en route to Trinidad, with our compliments. Cletus flies one in a Sig Quarter Scale J-3—and may it grace the blue Caribbean skies for many years.

Fortunately, to help answer the steady flow of mail, I have complete files of *Model Airplane News* back to you wouldn't believe when. And with the help of my "Glideline" reference guide, which I mentioned here once before, I'll be glad to refer you to any material previously

published about any specific engine. Your SASE with your request is appreciated. In all cases where back issues of the magazine in question are still available, I can only refer you to that issue and cannot furnish a copy of the article. I'm sure you'll see the reason for this.

The only exception can be for requests from overseas, and you guys don't even have to send a SASE—I know you can't get U.S. stamps; besides, my postage bill has been more than offset by the hospitality I've received in many foreign countries from groups such as the one in Trinidad.

New Miracle Plug

A new four-stroke plug has recently been announced by the Fox Manufacturing Company*. That, too, brings back memories—I remember a time when I was cleaning up at stunt and combat (control line) contests in the Tachikawa, Japan area. I was the first one there to have a Fox 35! The only two engine manufacturer survivors from those days are Fox and K & B. I wonder which is older? Someone please tell me—maybe I can get Duke to send you one of his new plugs.

Anyway, Duke's new plug is billed as a miracle plug and is described as having special heat-retaining features. Like all plugs available for four-cycle use, this one doesn't have an idle bar. Duke claims its performance is due to a built-in pre-combustion chamber.

Further claims include smoother throttle response, and elimination of a need for high-nitro fuels. Your engine will probably idle faster than it did previously, so a readjustment of the throttle is necessary.

The Fox four-cycle plug is for use with a maximum 1.5 volts, which means no 2-volt wet cells. Those of you with adjustable glow drivers should start with the plug out of the engine, and with the driver



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The BADGER Model 200 single action internal mix bottom feed air-brush will produce the same professional spray as the Model 150 without the flexibility of being able to change fluid amounts while spraying. The Model 200 has many of the fine features of the 150 and is ideal for the beginning modeler or anyone not requiring the controllability of a dual action air-brush.

BADGER'S 400 Detail/Touch-Up Gun is the ideal aid for finishing larger R/C models. This lightweight gun bridges the gap between the small precision

air-brushes and the hi-production spray guns with larger spray patterns. The 400 is available with fine, medium or heavy spray tips and adjusts for round or fan spray. Operates with BADGER Hurricane Model 180-4 1/2 hp. compressor or larger unit.

BADGER'S Foto/Frisket Film helps you customize and make special lettering, logos, insignias, etc. It is a 2 mil adhesive backed vinyl custom mask and stencil material which is easy to cut and will not buckle along cut edges when sprayed on. Available in convenient sheets or rolls.

Use BADGER'S Fluid Filter to eliminate lumpy paint or foreign particles that would normally pass through the air-brush and cause plugging. Designed for use with air-brushes that use jars or bottles, it slides on and off for quick cleaning.



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adjustment set at minimum. Adjust till a healthy glow is reached, and mark that point. Come to think of it, that's good advice for all plugs with which you are not familiar. There's a wide range in current requirements for the plugs available, and settings which are fine for one will blow out others—an expensive, and needless, lesson.

Synlube from Australia

More mail from overseas. This one is from Mall McNelley in Pannawonica, western Australia, and the subject is Synlube.

Mal writes: "I haven't noticed, while reading many of your articles, any reference to a synthetic lubricant available over here, called Synlube."

"This product is of local manufacture (Sydney) and is designed specifically for use in model engines, two- and four-stroke, methanol- or petrol-based. Where it really shines is with its use with four-stroke engines, allowing reliable running without resorting to nitro-methane dosing of methanol. Idling is very reliable, with full power runs not suffering noticeable power loss as one would expect when not using nitro. This is with *glo* engines, by the way, not spark-ignition systems."

"I was put on to the product as a result of reading an article in our own Australian bimonthly magazine, *Airborne*. Mr. Brian Winch is the author and it was reading of his experiences with Synlube that convinced me to give it a go. All I can say is, I'm very impressed with the results and wish I'd been made aware of it a long time ago.

"Should you wish to contact Brian Winch for more specific test details and results, you can do so through *Airborne Magazine**, or contact him directly. He is very helpful and knowledgeable, and I'm sure

he'll be able to supply you with worthwhile information. The manufacturer's details follow: Synlube High Performance Lubricants, Type FX-10 Glo-Glide, specifically for Model Engines. Brian Winch may be able to supply you with the company's address should you desire it. I hope this has been of value to you. Keep up the good work—I never miss a copy of *Model Airplane News*."

Well, Mal, I do know of Synlube, and it's imported by Model Research Laboratories, located almost in my backyard. I've also read some of the information—

(Continued on page 112)



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No. 110 Standard Axle Assembly
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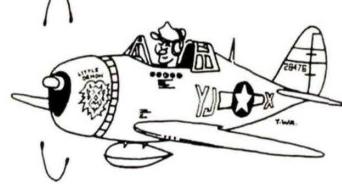
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FOUR-CYCLE

(Continued from page 111)

that appeared in *Airborne*, which is an excellent, up-to-date publication. You will have noticed, however, that while I haven't mentioned Synlube, I have also not mentioned any of the other new lubricants or fuel additives which appear from time to time. The reason for this is that I don't have any facilities by which to judge the long-term effects that these may have on an engine. I feel that most of the R/C airplanes in the air today are overpowered, speaking primarily of the two-cycle variety. That is one of the reasons, realistic power and speed, that make four-cycle engines attractive to me. There is one exception, which I'll mention next, but, ordinarily, gaining a few hundred more rpm, which might lead to a shorter engine-life isn't that attractive to me. The exception is racing, in which we have to accept the risk of short engine-life along with the other risks of the event for

the sake of going fast. And in that respect, I do know that some of the local racers have been using Synlube and reporting increased performance.

On the other hand, I don't just stick my head in the sand—a remark that an Aussie like you should understand—and not study and try new things. I do have the container of Synlube you see in the photo, and will try it as soon as I get some time. But like everyone else, I suffer from not enough time in the day. In the meantime I have written to Mr. Winch for any word on the long-term effect of Synlube, and I'd appreciate input from any readers who might have tried this new product from down under.

With that, it's time to say so long mates!

Eloy Marez c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

*The following are the addresses of the persons and companies mentioned in this article:

Dr. Walter Sturm, IM Strasser Feld 26, D-512 Hersogeuernth, West Germany.

Fox Manufacturing Co., 5305 Townson Ave, Fort Smith, AR 72901.

Airborne Magazine, 11 Dundee Close, Tullamarine, Victoria 3043, Australia: Brian Winch, 33 Hillview Parade, Lurnea, N.S.W. 21709, Australia. ■

SOARING NEWS

(Continued from page 106)

is currently at about 31% of root chord. The plane launches with near-vertical climb and very little wing flexing. The L/D appears to be very good, and the penetration even in windy conditions is better than I expected. The plane slows up very nicely for landings; the spoilers are effective, but produce a very slight nose-down pitching moment. The plane wants to circle at a high bank angle, probably due to insufficient polyhedral angle at the tips. Climbing efficiency is better at a lower bank angle, so a little opposite

(Continued on page 114)

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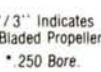
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SOARING NEWS

(Continued from page 112)

rudder must be held to prevent overbanking, flatten the circle, and maximize the climb.

"The Vulture Mark III will be my primary contest ship and I also will use it for my LSF Level IV goal and return flight as well as for my Level V tasks.

"Incidentally, besides the scale Schweizer 2-33 and Pratt-Read sailplanes that I'm working on, I'm also working on a couple of original designs. One is the Pelican, a 10-foot aileron-and-flap configuration, and the other is the Swallow, a 100-inch aileron-and-flap configuration. Both have fiberglass fuselages. The Pelican has foam-core wings with an aspect ratio of 14.5 and an Eppler 392 airfoil. The Swallow has an aspect ratio of 10.7, fully sheeted built-up wings (like the Vulture), and a Quabeck HQ 2.5/10 airfoil. I used carbon-fiber tow to reinforce the fuselages of the two planes. Here's how I did it: the tow was impregnated with resin and positioned inside the fiberglass fuselage. Then I took a balloon (one of the long, skinny twist-types used to make balloon animals) wrapped it with waxed paper and inserted it into the

(Continued on page 116)

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SOARING NEWS

(Continued from page 114)

fuselage, and inflated the balloon. The pressure forced the tow firmly against the inside of the fuselage. The balloon and waxed paper are then removed after the resin cures. I also use this technique to glue-in pushrod outer tubes, keeping them firmly attached for their entire length to minimize control slop.

"I have enclosed drawings of my aileron and flap hook-ups for the Pelican and Swallow sailplanes. Two servos are used for the two functions and they're placed in a 2-inch-wide center section that bolts to the fuselage. A Du-Bro* mixer is used to slave the ailerons to the flap movement. The flap-to-aileron pushrod has an over-center movement on the flap servo, allowing the aileron to drop with small deflections, but return to neutral as flap deflection increases. The ailerons are driven through a torque tube that plugs in at the wing root. I have also been experimenting with various Aerospace Composite* materials, mostly carbon fiber, in tow, cloth, and mat form; and also Nomex honeycomb. I'll let you know how they're working out."

Thanks, Pete, for your interesting ideas and excellent descriptions. Incidentally, Pete is a mechanical/composites engineer for McDonnell-Douglas Helicopter Company. I think he'd like to hear from anyone who may be interested in more details of his work. The sketches he sent to me of his Schweizer scale model 2-33 sailplane look like factory drawings!

Nats Special Awards—1986 Winners

Sid Axelrod Memorial Scholarship Award: Mike Garton, Senior.

Dick Black Trophy: Chris Matsuno, Open, 930 seconds.

Hi Johnson Award: Leon Kincaid, Open, 4,150 points.

McNeil Cup: Robert Sifleet, Open, 840 seconds.

George Meyers Craftsmanship Award: Dennis Crooks, Open.

Mulvihill Trophy: Frederick Blom, Open, 1,113 seconds.

Lee Renaud Memorial Award: Paul Carlson, Open, 12,190 points.

As you can see, Paul Carlson won the prestigious Lee Renaud Memorial Award by putting in the highest combination score in three classes: Two-meter (first place), Standard Class (second place), and Unlimited Class (third place) *with the same sailplane!* This is his own two-meter design, Prodigy, and was essentially a

(Continued on page 119)

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R/C NEWS

(Continued from page 119)

sities on a weight-lifting plane of not more than 1,200 square inches of exposed area. [The idea is] to lift the greatest weight in a maximum distance of 200 feet. Last year Concordia beat all 13 of us by lifting 14 pounds, 9 ounces with a Veco K&B 61 with a 15x8 prop. Their belt drive was broken down so they went to straight drive. In last year's program I directed my group as far as design and material. The plane weighed only 6.8 pounds (*I figure at this kind of design weight and the payload of last year's winner, the planes all-up weigh around 22 pounds—not bad for .60s—AFS*) using carbon fiber and Warren truss-type construction. Most of the planes in the competition were more like oversize fuselage pattern planes to permit the required load box size."

Interesting, you'll hear more when I hear more.



More From Ralph

You remember Ralph Pearson? He's the modeler who built a beautiful Shorts SD3-30 shown several months ago in the May 1986 M.A.N. Well, it's all finished and it is spectacular.

"In regards to the 'Commuter,' I've added an onboard 1,200-mAh battery for glow assist at low throttle. However, the total weight is still under 5½ pounds. It has not been flown, mainly because the guys want me to take it to Toledo. Outside of engine or radio failure, the darn thing has to fly! This is my first scale, but not my first model by any means."

Ah, the heart and soul of a scale modeler—always a pleasure to see when revealed. Ralph has his "all" in this bird and knows it *will* fly! I wait to hear of the results.

It's, once again, the season to be jolly. And so, I wish you and yours the happiest holiday season of all. I sincerely hope that your "Santa" stuffs your stocking with every R/C goodie you could want. More importantly, I hope your new year will be filled with health and happiness—I've learned that to be life's greatest gift.

Art Schroeder, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897.

*Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

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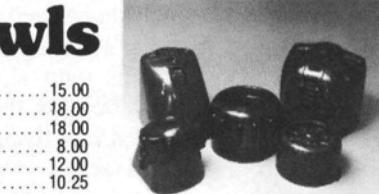
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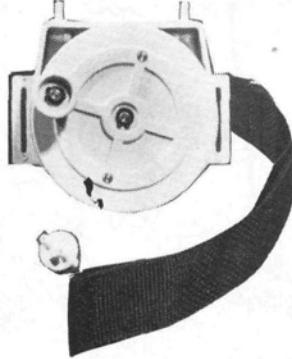
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SOARING NEWS

(Continued from page 116)

stock kit. Prodigy uses a special Michael Selig 4061 airfoil, and is available from Off the Ground Models*—Paul's own company.

Jim Gray, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897.

*The following are the addresses of the person and companies mentioned in this article:

Pete Richardson, 933 Magellan Street, Costa Mesa, CA 92626.

Flitespar: acquisition information available from Pete Richardson.

Du-Bro Products, Inc., 480 Bonner Rd., Wauconda, IL 60084.

Aerospace Composite Products, 28 Crosswood Rd., Farmington, CT 06032.

Off the Ground Models, 606 W. Anthony Dr., Urbana, IL 61801. ■

R/C NEWS

(Continued from page 81)

"Every component on the B-29 is handcrafted for the project. Pneumatically retractable landing gear were all custom designed and hand-built right down to the hydraulic brake components and feature a nitrogen-powered oleo system.

"Scale 38-inch diameter prop systems are driven by special reduction drives and specially built Quadra 100cc engines. Each prop blade was hand carved and locked into custom-machined scale hubs. Each engine was equipped with its own remote control starter and even had radio controlled chokes.

"Radio control functions, other than

retracts, starters, brakes, and chokes, included operational flaps, bomb-bay doors (fore and aft), and a retractable tail skid. A fail-safe redundant radio system was utilized with flight controls on one radio, brakes and bomb-bay doors on a second radio, and a third radio controlling the onboard starters and chokes.

"Radio equipment required for this project includes three transmitters (two Kraft and one Ace), four receivers, one error switch, eleven KPS 24 servos, seven Futaba FP-S14 servos, three SSPS-102 heavy-duty servos, two 4,000-mAh batteries, three 1,200-mAh batteries and two 12-volt batteries. All servo leads are shielded cables.

"We [at Byron Originals] hope everyone who attended this year's fun-fly in August understands that, as with any model, safety and the possibility of the unexpected happening ruled out flying [the B-29] in front of such a large crowd of spectators. (*It was certainly a sensible decision to hold off flying of the big bird in this writer's opinion!* AFS)

"All systems are go now and no less than two B-29s will be flying next year and will definitely play an important role in our all-new Aviation Expo '87, August 12 through 16, 1987."

I've been privileged to see so many remarkable achievements in model aviation over the years. None has excited me as much as the Byron B-29. Just looking at that big bird is enough to make anyone's imagination run wild. No, I never expect to ever build anything so big, heavy, and complex, but I'm surely pleased that someone did. My congratulations to the whole Byron team—"Ya done us proud!"

And The Beat Goes On

Byron never lets up, as shown by the latest kit, the BD-5J that I just received. This is one of those aircraft that has so many "sexy" lines and is so unusual that most modelers would not even attempt one in scratch. Yet, here it is in 40% scale and just right for "Joe Average"!

I often forget the titles of films I've seen, but I will never forget the James Bond flick in which a BD-5J was flown—and right through a hangar. I've always dreamed of flying one; now I'll have the chance.

The Byron BD-5J is in their familiar format (foam wings, fiberglass fuselage, and Byro-Jet fan unit) and follows the well-known complete-kit concept (all that's needed are finishing materials, retracts, and power unit). A thrust attenuator that permits full control of thrust output for landing and bringing the engine up on pipe for takeoff is available.

This one is my late fall project and you'll hear a lot more about it. So far, I can say it is a super kit of a very unusual aircraft.

More Weight-Lifting

No sooner did I mention weight-lifting as a competition event for R/C than I heard from good Canadian friend, Ray Gareau, with the info that such an event has been going on between a number of Canada's universities for awhile now. Ray says:

"I am involved as a consultant with Columbia University here in Montreal on a project for competition between univer-

(Continued on page 120)

Tach Master II

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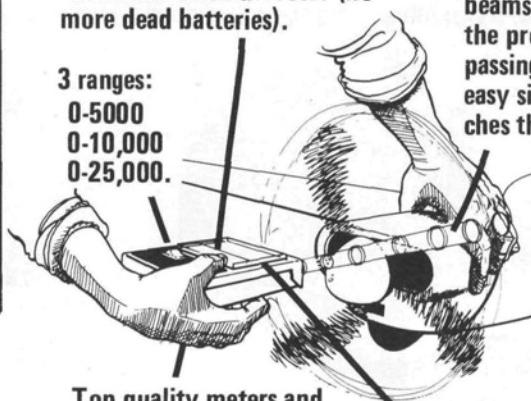


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O.S. CZ-1

(Continued from page 47)

about 30 degrees each side of a basic setting. Within the body of the screw there is a separate needle which is factory set, its screw-head being sealed with a black rubber plug which the user is instructed not to remove. The adjustment left to the operator is sufficient to allow the engine to be run a little rich during the break-in stage and, later, to re-set the mixture strength for maximum performance. Thus, the risk of setting mixture wildly out of adjustment is virtually eliminated and, provided that the user sticks to the procedures given in the O.S. instruction leaflet, no difficulties should be encountered.

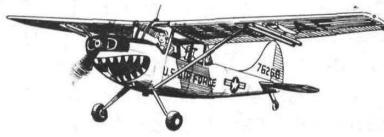
As previously mentioned, the CZ-1 is of advanced design and high quality construction. It is an ABC type engine, using a ringless aluminum piston running in a thick-walled brass liner having O.S.'s special ultra hard wearing nickel-based composite all-over plating. A Schnuerle-plus-third-port scavenging system is used. The cylinder head has a bowl-and-squish combustion chamber and neat tapered cooling fins.

The main casting, comprising crankcase, front housing and cylinder casing, contains two 9x17 mm ball journal bearings to support the one-piece hardened steel crankshaft. The 9 mm diameter shaft has a 6.6 mm bore gas passage fed from a 10 mm long valve port and its 4 mm crankpin has a 3.2 mm diameter spigot that engages a slot in the starting shaft drive disc. The starting shaft runs in an 8x16 mm ball bearing at the outer end, supplemented by an 8 mm i.d. bronze inner bush, both bearings being contained in a substantial rear housing. The starter cone has a diameter of 29.4 mm, is keyed to a flat on the shaft with a headless set-screw and is firmly retained with a special hex socket round head screw.

The Max CZ-1 obviously has the makings of a very powerful little engine and we were not surprised to learn that the production motor is a detuned version of the prototype which proved to be too powerful for the intended buggy application.

The engine comes fitted with an O.S. No. 8 glowplug and a glowplug wrench and starting cord are also supplied.

Peter Chinn, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. ■





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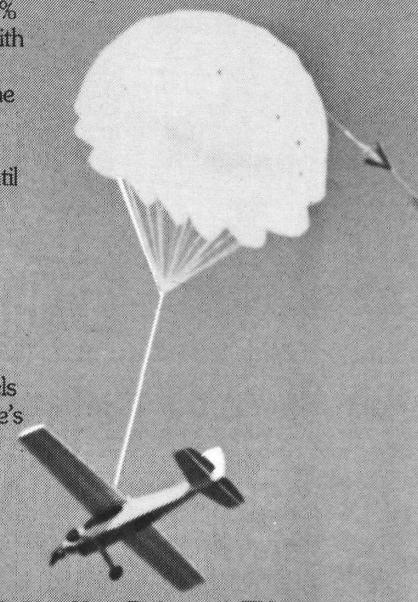
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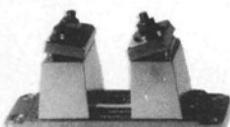
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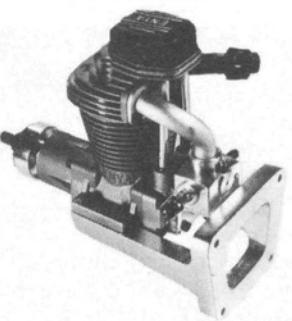


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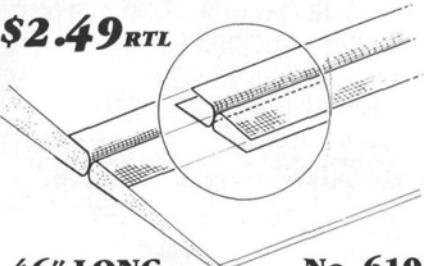


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GOLDEN AGE

(Continued from page 66)

mentally sound, and it worked reliably in its simplest, and even crude, form. With Rockwood's pioneering, others would develop reed systems to their maximum potential.

Edward Rockwood would never realize the commercial potential of his innovation. When the opportunity was greatest he procrastinated while others seized hold and developed their own versions of the resonant reed system. When his dreams weren't fulfilled, Mr. Rockwood became very despondent and decided to end it all. A sad ending to what might have been a brilliant career.

It was members of the Mustang club, with Rockwood's guidance, who convinced the R/C fraternity of the reed concept's value with their contest performances. Alex Schneider quickly became the group leader with three Nats wins with only three tries—but we'll save Alex's doings until more space is available.

Info from Gordon Rae of England is very enlightening. While Americans were struggling and enjoying early R/C, other countries were doing the same. We did our thing with radios by Berkely Control Research and Citizen-Ship. Yet imports with names like E.D., and I think, Eta, among others, were showing up in hobby shops, showing that something was happening overseas too. Strangely, not many Americans had much success with the imports—perhaps because they were just foreign to us?

Gordon Rae got into R/C in the early 50s with a most unusual design of his own. First of all, he didn't appreciate the constantly changing characteristics of the then popular gas tubes. So, he designed and built his own "hard valve" (vacuum tube) receivers using "quench coils," which became popular here also. Apparently he had considerable success.

His first notable R/C model design he labeled the Demon. One progressive objective was that it had to be "aerobatic"—when most of us were just hoping for R/C flight!

The .15 diesel-powered design had a futuristic appearance with sleek lines and semi-elliptical wing planform. Even the construction was quite modern and used what he called "contour" wing ribs—a take-off on the "cap strip" method. Strange, but in the same time period I had experimented with cap strip ribs for wings and tails. The final version did work neatly but seemed more complicated than the usual sheet ribs.

(Continued on page 130)

NAME THE PLANE CONTEST

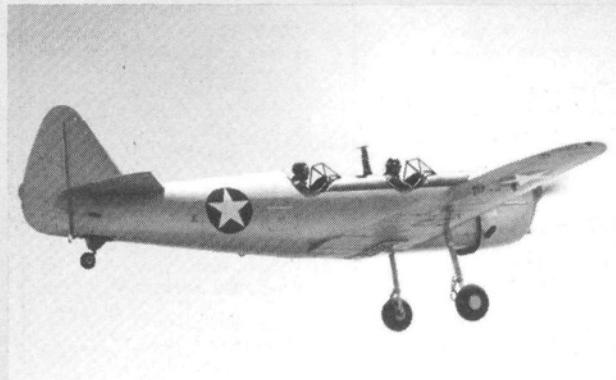
Can you identify this aircraft?

If so, send your answer to **Model Airplane News**, Name the Plane Contest (state issue in which plane appeared), 632 Danbury Rd., Wilton, CT 06897.



The mystery airplane featured in our November 1986 issue was the Ryan PT-25. Developed by Ryan Aeronautical of San Diego, California, as a military trainer, it was constructed from plastic-bonded plywood due to the shortage of metal in 1943. Powered by a 185-hp Lycoming 6-cylinder horizontal opposed air-cooled engine, the airplane had ideal flight characteristics sought for initial military instruction purposes, according to Joe Rust, Ryan test pilot.

Congratulations to Edward F. O'Donnell of Janesville, Wisconsin, for correctly identifying our mystery aircraft.



The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S.

Mail. If already a subscriber, the winner will receive a free one-year extension of his subscription.

GOLDEN AGE

(Continued from page 122)

One of the problems with single-channel rudder-only flying was that if you used enough rudder-action for maneuvers you then had too much for cruising flight. With most designs, rudder would turn the model and when far enough into the turn the nose would drop. Excessive rudder-action could lead to disaster! With multi-channel controls you use a combination of rudder and elevator to keep the nose on the horizon.

Gordon realized the need for elevator-action and actually achieved it with only one rudder. He theorized that when the rudder was turned, if it also had some horizontal deflection, it could provide some elevator-action. Sort'a like the action of a V-tail.

He experimented by hinging the rudder to a wire rod which could then be deflected at an angle to the line of flight. His results showed that when the hinge line was at a 30° angle to the flight line the nose would not drop in turn. Quite a neat trick for that day!

I don't know if Ed Kazmirski knew Gordon Rae or not. But big Ed's successful, latter-day Taurus design featured a swept-rudder hinge line for the same purpose. Ed had seen "rolling" problems in the wingover maneuver and solved them neatly with the Taurus's swept tail!

Gordon Rae also envisioned inverted flight with rudder-only and a flat-bottom wing airfoil. His design approach for that was a pendulum-operated elevator! The pendulum weight linkage was arranged so that when upright the elevator would be in neutral; when inverted there would

be a down-elevator trim setting. Gordon indicates that it took a considerable amount of experimenting to find the correct amount of "down" for extended inverted flight. His greatest success came after switching to a semi-symmetrical wing section.

We hope you gain an appreciation of the innovative thinking that went into this early R/C design. Like many early R/Cers, Gordon came into R/C from extended free-flight activities. He's still active today with R/C gliders and F3B contests; perhaps you saw his vintage Gamma Gull construction article in the January 1986 *Model Airplane News*.

Please remember, much of the information you've been reading stems directly from the readers of this magazine—your OT R/C place—where input is always welcome.

(Continued on page 131)

Club of the Month

Flare-out

TWIN CITY RADIO CONTROLLERS, INC.



Hal "Pappy" deBolt, c/o *Model Airplane News*. ■

CONTROL TOWER

(Continued from page 14)

servo-reversing switches, which are marked by channel number and are left to right: channel 1—aileron; channel 2—elevator; channel 3—motor; channel 4—rudder; channel 5—landing gear; channel 6—flap; channel 7—spare. The down position is normal and up is reverse-throw. Rounding out the transmitter is a charging jack on the lower right side of the transmitter case.

The Expert receiver is advertised as having 1991 standards, which means it has the new narrow bandwidth characteristics. I'd hoped to be able to check the frequency selectivity by the time this article was complete, but because of the unavailability of proper test equipment, it hasn't been possible. I'll have a report, however, in a future column. The receiver is dual-conversion with the first IF at 10.7 MHz and at the familiar 455 kHz. The operating-channel crystal module is replaceable. It is accessible by removing the back cover.

I believe that all of the key technical features of the Expert have been covered, so I'll conclude by saying the Expert is a class seven-channel radio system with many special features at a very reasonable price. It is well made and in my testing performed very well. When you buy your next radio, take a look at this one.

The following is the name of the manufacturer of the system covered in this article:

World Engines, 8960 Rossash Ave., Cincinnati, OH 45236. ■

N3 PUP

(Continued from page 21)

former in place and use very soft $\frac{1}{8}$ -inch sheet balsa to cover the area between the panel and firewall. It's easier to do in three pieces (one between the wire braces; others on each side). Finally, add the plywood gear mounts and $\frac{1}{4}$ -inch-square balsa stringer on top between aft spar carry-through and the rudder post to complete fuselage basic structure.

The nose shape is designed to fit a Sig Manufacturing Company* molded-plastic cowl, No. 289. If you elect not to use it, you may mount your engine to the firewall with any popular radial mount

and build a balsa cowl to suit. Form the main landing gear of two pieces of music wire (refer to plan for dimensions) and wrap and solder close to the axles.

I chose to mount my radio far enough aft to balance the plane. (If you wish to put your radio in the cabin, do it your way and disregard the rest of this paragraph.) I chose one bay for the twin and a different one for the single. I simply lined the appropriate bay with $\frac{1}{8}$ -inch balsa sheet from the center longeron up and stowed the receiver and battery therein. Next I added two crosspieces at the center longeron for servo tray rails and mounted the rest of the radio upside down at this point. The aileron servo is mounted upside down on the cabin roof and fitted with ball links for snappy disconnects of linkages in each wing panel. The other servos are connected to their respective controls with flexible pushrods and the antenna is routed according to the manufacturer's instructions.

Now is a good time to fit the tail pieces to the fuselage and make all the necessary linkages to connect with each servo respectively. Mount the tailwheel assembly as shown and connect to the rudder. I recommend using Super MonoKote* covering because it is strong and makes good hinges; however, the fabric-textured coverings would be more scale-like. I also think it's easier to cover the parts individually and then glue them in place.

Commence the wing assembly by gluing the $\frac{1}{8} \times \frac{1}{4}$ -inch balsa strips along the spars from root to tip-rib only. This serves to make spars fit carry-throughs and tip plates properly. Both ends of each spar should be tapered also. Pin spars in place over the plans and match to rib notches. Also, notch leading and trailing edges to match the rib locations. Glue each rib in place being mindful of locations of the three plywood rib-locations in each panel. Add the leading and trailing edges and the tips. Install the triangular braces on top of each spar at the inboard rib spar junctions as shown on the plans. Also, add the $\frac{1}{8}$ -inch-ply triangles for bellcranks. The wing assembly may be removed from the plan at this time. Cut the aileron loose from the wing by making the angle cuts on each rib first. With aileron removed, trim the remainder of the unwanted portion flush with the rear spar and add $\frac{1}{4}$ -inch balsa sheet to the top of the rear spar, between ribs along the entire length of the aileron-well.

Study the drawings of the aileron hinge pins and horn installation. Bend the outboard pin to the shape shown, glue to end-aileron rib then glue rib to aileron

(Continued on page 132)

Besides having one of the finest flying sites in the country, the Twin City Radio Controllers of Minneapolis, Minnesota, are also privileged to have a group of modelers that are dedicated to the true spirit of the hobby—sportsmanship—and are therefore selected as the *Model Airplane News* "Club of the Month" for January 1987. The officers of the club include President Vernon Hendrix, Vice-President Claton Cadmus, Secretary Edward Nemitz, and Treasurer William Altenhofen. Coupled with these very dedicated individuals are John Benson and Bud Stitt, Editor and Publisher, respectively, of a very fine club newsletter *Flare-Out*.

In the September 1986 issue of *Flare-Out*, a full report of the club's 30th Annual Open was given. That's 30 years of friendship, giving, and hard work, and they are justly proud of the achievement. The Annual Open is a pattern and scale contest that draws contestants from all over the country, and CD Jim Ronhovde did a superb job of keeping everything organized. If you have an empty calendar for August 1987, the Twin City Radio Controllers would love to host you at their 31st Annual Pattern and Scale Contest. You won't regret it.

We applaud the Twin City Radio Controllers and are pleased to award to them two free one-year subscriptions, which are to be given by them to their outstanding junior members.

Congratulations!

Each month *Model Airplane News* will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). *Model Airplane News* will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletter to *Model Airplane News*, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

N3 PUP

(Continued from page 131)

trailing edge. Likewise, fit and glue aileron horn to inboard end. Notice that the inboard hinge passes through the innermost hole of the aileron horn. Finally, add the $\frac{1}{8}$ -inch balsa aileron leading edge and sand the assembly carefully.

Cut a short nylon tube to fit the outer pin and glue tubing to notch in wing tip then reinforce with cloth tape. Cut the T-shape slot in $\frac{1}{16}$ -inch sheet balsa, then laminate to the inboard hinge-support triangle and install on the wing. Note that the small square nylon part that normally serves as a nutplate for the horn is glued on the inboard side of the plywood rib at the inboard end of the aileron-well. The hinge pin (L-shaped) passes down the T-slot, through one hole in the nylon piece, through the plywood rib, through the inboard rib of the aileron and finally through the hole in the horn. The L-shape pin is secured with the wood screw at the end of the middle T-slot. Thus, disconnecting the short pushrod, removing the L-shape pin and rotating the aileron allows it to be removed for whatever reason. When satisfied with the hinge action, connect and install the bellcrank

to complete the installation. Resist the temptation to reverse ailerons' location. They are installed with the big gap at the top because they work a lot better this way. These are called "Friese style" ailerons and they reduce the "aileron reversal" phenomenon of high-wing slow-speed aircraft. Believe it!

When you've finished both wing panels, plug them into the center section and check the dihedral. Cut the dowels to proper length, bevel the ends to match wing and fuselage angles, fit a metal strip on inboard end of large dowel and bind in place with carpet thread as shown in the picture. Bend two jury struts from coat hanger wire and slip over outboard ends of the strut assembly. Drill holes in dowels and attach-points for wood screws, install struts and recheck the dihedral.

Clamp inboard wing panels to center section and with a long drill bit drill pilot holes for retaining screws through spar carry-throughs and spars. My retaining screws have wing nuts soldered to the ends of them so I need only a screwdriver to install or remove the wing panels.

Mount the engine on a riser block, if necessary, so the prop clears the nose cowl. Trim the cowl to fit over the engine

and attach it to the firewall. My favorite method is to use screws through nylon L-shaped brackets, which are also screwed to the face of the firewall. Install the tank between the firewall and instrument panel. A 6-ounce tank is plenty for the four-stoker. Don't put anything below the tank, because that's where the pilot's feet go. Yes siree, you'd better put a pilot figure in the model. If you don't, then tell others you designed the plane yourself—R/C models without pilots in the cockpit are *dumb!*

There are several types of clamps to hold the landing gear in place. The ones I use are metal straps that go all the way around the wire and attach with sheet-metal screws inboard of each wire.

The struts are functional, so make sure they attach securely. I don't have the courage to fly either of my models without them to see just how necessary they really are.

Before flying, be sure the plane balances where indicated on the plans. Also insure that there are no warps in any surface and all controls function normally. Left is left, and so forth! Flying the Pup is the main reason we went to all the trouble to build it and you won't be disappointed with its performance. As we said in the

(Continued on page 134)

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N3 PUP

(Continued from page 132)

beginning, the twin .90 is too much
engine. Normal takeoffs are made at half
throttle. More is used for vertical maneuver-

FLYING. The Pup will do consecutive
loops from level flight. Rolls are sur-
prisingly smooth considering the flat-
bottom wing and long span. Hammerhead
stalls and wingovers are really pretty
when augmented by more rudder control.
I fly with aileron and rudder mixed; that
is, aileron stick gives aileron plus 50%
rudder, but rudder gives only rudder.
Halfway through the aforementioned
maneuvers, I send additional rudder com-
mand with rudder stick. Works great!
The airplane stalls easily and enters a spin
realistically. Yes, it will fly inverted with a

lot of down-elevator held constantly.
When inverted, left is still left.

Touch-and-go landings are the great
joy of flight and the Pup is really fun in
this respect. It looks so scale-like with a
pilot in there. A little practice lets you
touch one wheel only or one then another
and then both, then all three, and so on.

Build one today. And may all your
flying be as much fun as mine.

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companies mentioned in this article:

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2635 South Wabash Ave., Chicago, IL 60616.
Sig Manufacturing Co., Montezuma, IA
50171.



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